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Infosystems

The Magazine for Information Systems Management

Part 1

13th Annual Micrographics Usage Survey

'So you want to work at home, eh?'

Infosystems

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April 1983 Volume 30 Number 4

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Management

Successful IS plans link closely to business plan

An information system plan stands a greater chance of succeeding if it ties closely to the organization's overall business plan, according to a survey by Cresap, McCormick & Paget (CMP), New York management consultants. Over 95 percent of 334 survey participants—equally divided between large manufacturing and nonmanufacturing organizations—say they have some information system (IS) plan in place.

"Two important goals of IS planning are, first, to assure that overall business programs receive the IS support they need and, second, to allocate scarce IS resources wisely," comments Eric Knutsen, a CMP principal who directed the study. "Consistently, those respondents who forged links between their IS and overall business plans benefitted on both these counts."

Among survey companies that explicitly state IS needs in their overall business plans:

- 86 percent say their business plans are assured of needed IS support; only 39 percent of those who do not state IS needs in their business plans made this claim.
- 86 percent say their IS resources are allocated wisely; only 51 percent of those who do not spell out IS needs make this statement.

Survey participants in the chemical and petroleum industries, as well as those in the combined electric and gas utilities industry, rank high in reporting successful information systems planning. Fifty-eight percent of the chemical and petroleum companies, for example, report that their planning efforts had assured needed IS support for business programs. And 79 percent of the combined utilities and 68 percent of the chemical and petroleum firms say their planning activities had resulted in the wise allocation of IS resources. Computer and component manufacturers, ironically, rank low in comparison to their industry groups in reporting benefits of IS planning.

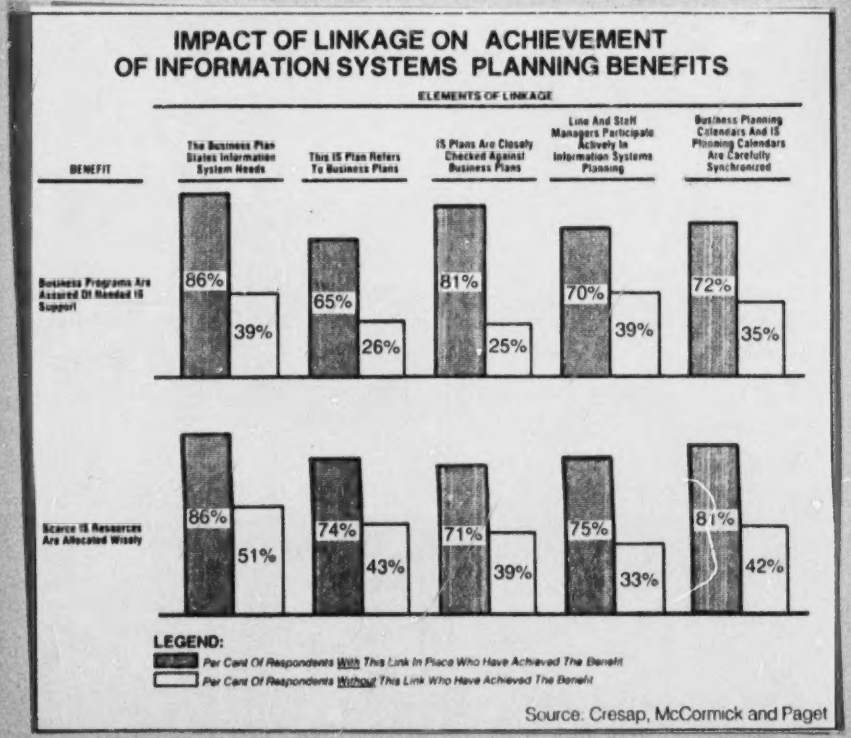
IS planners seem to have more difficulty in understanding the direction and requirements of their own companies than in coping with technological uncertainty.

- 26 percent of all respondents cite as the number one IS planning problem "lack of knowledge and business direction and requirements."
- Only 11 percent rank "uncertainty about the future of technology" as the number one problem.

"Planning for information systems is as much an art as a science," Knutsen contends. "Managers who undertake IS planning must take into account projections of business scenarios—for their companies, their industries and the economy as a whole—as well as possible changes in the information systems technologies."

Knutsen says managers must ask such questions as: "In line with these anticipated developments, what will our IS needs be? What action programs are required to fill those needs? How can we best develop our resources—people and equipment—for these foreseen requirements? And what will be the cost of equipment and staffing in the years ahead?"

—WLR



Source: Cresap, McCormick and Paget

A challenge to MIS: Manage, don't control

Management information systems (MIS) executives should not concern themselves with controlling every aspect of office systems use. Rather, "your task is to assume a management role, ensuring that technological opportunities are understood, carefully planned and smoothly introduced."

That's the assessment of John F. Cunningham, the new president of Wang Laboratories Inc., speaking at the recent Office Automation Conference in Philadelphia.

"More frequently, you are giving responsibilities to line management. This gives you more time to set strategy and standards, to conduct research and pilot projects and to interact with upper management as a key staff consultant," Cunningham said.

That approach would give MIS executives the opportunity to manage such things as the influx of personal computers (PCs) in businesses rather than control them. "It is one thing to loosen control; it is another to allow the unsupervised flow of technology into an organization," he said.

. . . *continued on page 24*

The blossoming of personal computers within corporations has raised fundamental questions for MIS managers.

By Frederick W. Miller, Senior Editor

It's a problem that's been talked about and written about and dealt with. But it's a problem—or an opportunity—that won't disappear for most Management Information Systems/Data Processing (MIS/DP) managers. Size of the organization—Fortune 500 or XYZ Local Manufacturing—may have little relationship to the problem.

Simply stated, the problem is control over data processing resources, especially the newer desk-top and personal computers and associated data files. They're popping up like spring flowers throughout corporations, colleges and universities, management consulting firms, local airports, gas stations and people's dens.

Control is only part of the problem, but that may be because it is early yet in the life cycle of this new form of personalized, do-it-yourself data processing. The real problem of control may not come until the "owners" of personal computers attempt to tie into and use corporate data bases ruled over by MIS/DP. These owners are department managers, budget supervisors, technical support personnel in MIS/DP, division controllers and the like.

Some owners bought their own personal computers a couple of years back and took them to the office to handle budgeting and forecasting. Others were "bootlegged" into the office or plant, disguised on a company purchase order as an office machine, or furniture or something other than computer equipment. This avoided the purchasing process in many companies requiring that "all" data processing equipment purchases be funneled through the MIS/DP department.

Met with cheers

"Users have flocked to personal computers for their ease of use and simplicity of use," said Robert Freeman of INPUT, a research firm, in a recent study entitled "Personal Computers in the IS Strategy."

"An estimated 75 percent of all corporate departments used their first personal computers within the past year," Freeman continued. "Personal computer use in large corporations has met with cheers from end users, but information systems (IS) departments are concerned with the problems posed by their uncontrolled growth. Differences will continue and worsen unless IS organizations adopt specific plans for implementing personal computers into their overall information strategies."

Despite early successes with personal computers, Freeman described problems as "real and growing." He cited incompatibility of hardware and software as an immediate example.

"Due to its relatively low cost, most equipment is purchased by the end-user department. But software bought for one machine will not always work on another, even though they may have the same operating systems," Freeman said.

"Neither is all hardware compatible, compounding the potential for waste, duplication, and even unknown costs," the INPUT report noted. "A similar situation developed a decade ago with the advent of timesharing. When corporate management realized the full extent of its use, measures were taken to re-establish internal control and budget DP needs in-house."

Freeman mentioned corporate data access, data standardization, documentation, training, support, volume discounts, and dealer selection as posing real problems for information systems strategies.

The study also lists the major application areas for personal computers. Electronic spreadsheets, or calc-like programs, are the most widely used, followed by word processing, languages and systems support, business planning, graphics, office support, data base management and communications.

No host communication

Another voice crying "danger" belongs to David L. McMaster, president and co-founder of Gateway Communications Inc., Santa Ana, CA. He said "the recent explosion of personal computers into the corporate environment has created a challenge for top corporate management.

"The variety of stand-alone personal computers purchased by individuals or local departments without sufficient planning or control by MIS or DP managers has created a 'tower of Babel' situation in which the local battle may be won, but the overall war of cost-effective information flow may be lost," he continued.

McMaster pointed out that most personal computers cannot communicate with each other or with remote mainframe hosts. Host-connected terminals must now reside next to stand-alone personal computers to perform overall system functions. Costs go up and control is in the hands of everyone except where it should be—at the top, he stressed.

McMaster's firm, a split-off from Control Data Corp., has developed and is marketing a "gateway processor" that allows terminals and the IBM Personal Computer to communicate locally over a local area network, and then provides long-distance communications access to 3270 BSC, 3270 SNA and X.25 networks, he explained.

"There is a definite requirement for personal computers to be integrated into the overall distributed processing environment of Fortune 1000 companies," McMaster stated. "Our strategy is to offer a local area network and a wide area access for IBM's personal computer. There is an

abundance of product-oriented companies that are selling hardware, but very few are providing systems solutions to the user's problems."

Some of the problems raised by INPUT, and McMaster, already have been met and answered. One set of answers comes from a large midwest manufacturing company. Another similar set comes from Illinois Tool Works Inc. (ITW) in Chicago.

Handling it head on

A firm that has met the personal computer revolution head-on is Illinois Tool Works Inc. (ITW), a $500 million diversified manufacturing business with 18 domestic divisions and 22 international subsidiaries. The company has a small corporate MIS staff to oversee the nearly autonomous divisions.

ITW now has about 20 personal computers in use, most of them Apple III units. The primary applications are financial analysis, budgeting, and corporate consolidation of monthly financial data from the 40 units, according to Denny O. Wallace, director of management information systems at ITW and a member of the INFOSYSTEMS' Chicago User Council.

Controllers and financial analysts develop quarterly forecasts for the 40 units, and paste them together to form a giant sheet. Because of the nature of the electronic spreadsheets, revised forecasts, or minor corrections can be generated and printed with minor effort.

Wallace said he and Tom Fox, manager of technical support at ITW, recognized the potential "big danger" of personal computers invading the corporation about two years ago. "We learned all we could" by reading magazine articles and visiting retail computer stores, he explained. Then Wallace and Fox issued a memo to management stating that the two of them were knowledgeable and somewhat "expert" in personal computers. If any management person needed help in selecting, acquiring and using such a machine, Wallace and Fox would help them.

"We pretty much stuck with four of the more popular brands: Altos, Apple, TRS-80 and IBM. We did not try to select a standard," Wallace said. "It's worked out so far and we're happy with the arrangement. We tend to provide counsel and advice. We act like an internal consultant. We work with the users up to a point in defining their needs and suggesting two or three alternatives with appropriate software, and then we back away."

Although most applications are financial and use the VisiCalc program, the corporate community relations manager uses the dBase II data base management software package for various personnel functions. One ITW manufacturing plant acquired two Xerox 820 personal computers and uses them for product order tracking and order posting for a department that molds plastic keytops used in a line of CRT keyboards, Wallace explained. The DP manager in that plant wrote the programs for these two jobs in BASIC. He also developed a binary search access routine based on one that appeared in a personal computer magazine.

Because ITW is both diversified and autonomous, most divisions have their own large DEC PDP-11/70 minicomputers for local processing, while the corporation has a medium-scale IBM mainframe for consolidations and corporate DP tasks.

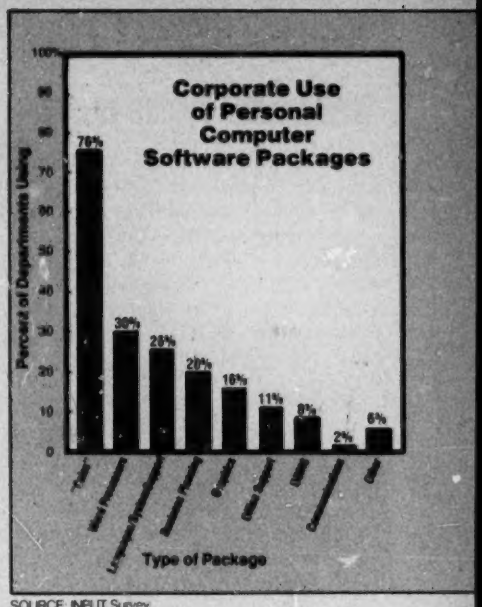
"There is no clamor for the personal computer users to get into the corporate data bases," Wallace said. "None is keeping a data base that is inconsistent with corporate or divisional data bases. And we understand that it's not easy, or efficient, for the personal computer to get access."

Avoiding conflicts

Wallace said he is trying to avoid conflicts between data generated by personal computers and that generated by divisional or corporate computers. Many users take data from corporate computers and re-key it into their personal computers for manipulation.

There was a "big flurry" to acquire personal computers a few months back, and the number installed jumped from two to 13, but now, Wallace said, acquisition and installation are at the rate of about one every three months. "We haven't seen it get out of hand at all," he added.

Wallace expects, however, that each division controller will have his own personal computer by year end 1984. At present, only six of 18 have



SOURCE: INPUT Survey

them and group controllers on the corporate staff are using four others.

Wallace was asked about training for personal computer users. Fox and he don't intend to do any because it's part of the very nature of personal computers—they are personal machines that can be learned by most users who read the manuals and follow the examples in the manuals.

Cost justification and approval, Wallace said, have been left to the manager of the functional area considering the personal computer. "Our president doesn't want us to tell a profit center how to make a profit," he concluded.

Initial learning

"In general, there was some initial learning, and there's still a lot of learning and development going on," said the supervisor of forward planning in the DP department at a Michigan auto parts firm.

"Top management is starting to see the advantages and what they (per-

sonal computers) can do. But you've got to show some kind of cost justification that is reasonable, just as if you were buying another computer or a piece of machinery. What's the economic benefit to the company? As long as we can show reasonable justification and use, they've been supportive," he said.

The first personal computers to arrive at the parts facility were Commodore Pet computers. "They got into the plant prior to DP getting into the act," the supervisor commented. "When we saw some of them and did a little investigation ourselves, we said, 'We think this is a good tool to achieve our goals.' That's when DP took it upon itself to get into the act and try to coordinate and support and kind of 'mother' the micro revolution, if you want to call it that. We're trying to control it and coordinate it and guide it."

When asked about the control aspect of purchasing and using personal and microcomputers, he explained that all business computer-related hardware is funneled through data processing for approval, and then it goes into the firm's normal approval system for the appropriate levels of signatures depending on the amount of dollars involved.

"We also procure all of the soft-

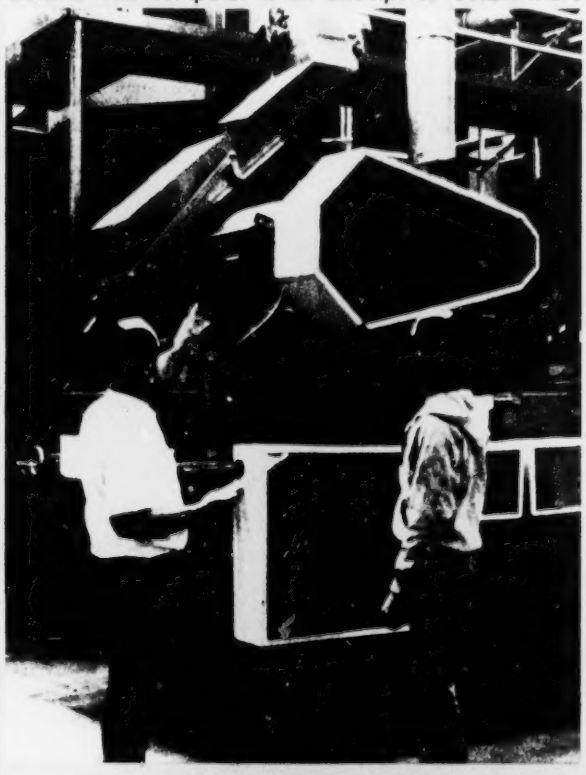
Farm Co-Op Uses Microcomputer to Analyze Information

North State Hulling Co-Op Inc., which represents about 100 almond growers in California, is using a microcomputer to handle a complex accounting system and to help improve efficiency in its almond hulling process.

Larry Rinehart, general manager of North State, said the co-op acquired its Altos 8000 computer system to improve field production and to better monitor the overall business. Established in 1968, the co-op hulls almonds for growers within a 50-mile radius of Chico. The growers collectively harvest more than 6,000 acres.

During the growing season, which runs from mid-August through October, growers deliver truckloads of almonds 24 hours a day, seven days a week to the co-op, resulting in the processing of up to 30 tons of almonds per hour during this three-month period.

"We've always had the means of controlling the process for quality, and we've had no problem in compiling sufficient data on the operation," Rinehart said. "But we required the means to analyze that information to maximum benefit. The computer is an attempt to obtain more timely, comprehensive reports than we could get manually."



Data accumulated throughout the growing season is entered into the computer. This data includes moisture content, which is used as the basis for billing, quality control factors and operations costs. North State compiles several reports from this data, which allows the cross checking of each phase of the hulling process to determine where improvements can be made.

For example, one recent report located bottlenecks and problem areas in the production line. Other reports compare hulling machines by vendor, enabling management to determine which machines produce the best results; and compare equipment operators, and other parameters, that affect final output of almonds.

One key area of quality control concerns the percentage of chipped or broken nuts, a problem that can be laid almost entirely at the feet of the hulling machines and/or their operators, a spokesman said. Chipped nuts, Rinehart said, can result in a two-to-three cents per pound profit loss for a grower. "When you start talking about thousands of pounds, that adds up," he added. Comparison reports have allowed management to pinpoint which machines are the source of the problem and to perform repairs.

North State Hulling also uses the Altos computer as a research tool to study the effects of different drying temperatures on almonds. "The degree of heat can be either beneficial or a real problem. We are trying to determine the optimal drying temperatures," Rinehart said.

When obtaining the computer system, Rinehart followed the suggestion of his accountant and contacted Technocrat Enterprises, a San Jose, CA, dealer. Installation was made in December, 1980.

"I recommended the Altos 8000 computer system because it could handle both the accounting and the production requirements," said Bill Neubert, president and general manager of Technocrat. "It's a highly reliable machine."

Working with the co-op accounting firm, Neubert modified the accounting software to meet North State's requirements.

"I don't want to lead anybody down the primrose path," Rinehart said. "Implementing an agriculturally-oriented system, such as ours, takes longer than overnight, and we are still working to come up to our full capacity. On the other hand, we fully expect that the system will lead to an increased profit margin on next year's crop. And that's what we think a computer in a co-op is all about." □

For more information on the system described in this report, **Enter No. 11** on the Reader Information Card.

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MICRO/MINI INFO

ware for each of the users in the areas of micros," he added, noting that the total process, including approvals, can take about two months.

The first "official" microcomputers arrived in October, 1981, and supplemented the Pets that were on hand. But since last summer, most of the remaining personal computers have been purchased and put to use. This includes six Apple II units, 30 Apple III units, and two IBM Personal Computers.

The minimum configuration of the Apple III is the computer with 128K bytes of memory, two floppy disk drives, monitor and dot matrix printer. Newer systems to be ordered will be specified with 256K bytes of memory because the Advanced Version of VisiCalc, an electronic spreadsheet program for the Apple III, takes advantage of that much memory.

"We've got some horrendous size budget data that we do with them and the 256K is nearly the minimum," the supervisor explained.

The auto parts firm uses personal computers throughout its 10,000-person facility for four principal tasks: an electronic spreadsheet for manipulation of budget data, some type of data base for intra-department data handling, project and manpower scheduling with the VisiSchedule software package, and word processing with Word Juggler on the Apple III computers. The spreadsheet program is used by budget supervisors within the many departments and by staff financial analysts.

The data base software, the PFS family, includes a file management system, report writer and graphics package. This is used for tasks such as a tracking system for purchasing orders, reject analysis in quality control, and employee address and phone number files.

Productivity tool

"Because most of the people don't have a DP background, they can pretty well use PFS to their advantage to do what they want to do," the DP department supervisor said. He noted that he was recruited by and transferred into data processing about three years ago after spending several years in both plant engineering and manufacturing in the facility. "With PFS, it's pretty much booted in (loaded into the computer) and you go from there.

"VisiSchedule is about the same way. It's a matter of plugging it in and going through and using the sampler. We certainly stress that you read the documentation, go through and try to do it on your own. We're looking at this as a personal productivity tool and we're really not geared up to do a lot of in-depth support. We try and do a minimal amount, to get people into a comfort zone and then let them go from there."

He believes it's much better for people to learn themselves because they don't forget. If somebody does something for you all the time, then you are very prone to fall back on that mechanism rather than learning it yourself, he added.

The firm uses the VisiSchedule program for project planning, intra-department planning, and manpower planning and resource leveling in technical support within the DP department. The tooling department, for instance, uses the program for laying out schedules needed to build new products. This includes the type and timing of engineering activities, product reviews, equipment ordering, and lead times for equipment. The product engineering department, which feeds the tooling department, has started to use the program to determine the engineering and design steps needed to develop a product prior to its release to the tooling department.

"We have a large (scheduling) system that runs on our mainframe, but it doesn't track in nearly the detail," he said. "It's more of a macro system rather than a micro system, as far as the detail level that it keeps.

"We have generally been very supportive of the micros, per se, because of the productivity gains that we can see. I see it (use of personal computers) continuing and accelerating, at least the requests. We're trying to control the actual pieces of hardware. We're not just carte blanche giving everybody one. We're trying to fill a good justified need, rather than 'I want one because so-and-so has one'."

The auto parts firm is looking at cost avoidance and improved benefits, according to the supervisor. Anything that can show economic benefit to the company is fair game. The company essentially leaves it up to each individual who wants a machine to put together the economic justification for it. "Obviously, if we see something that we think isn't correct, we certainly will bring that to light," he added.

"It's not just a rubber stamp," he continued. "Our controller is very cautious, in that he wants to make sure we're getting the bang for the buck. The cost avoidance things they use (for cost justification) have got to be fairly air tight."

In a couple of instances, personal computers have been "traded off" against money being spent for outside time-sharing services, and in other instances, the desk-top computers have been used to "pick up the slack" and supplement work previously done by employees who have resigned or retired, he explained.

The firm bought its computers at a local area retail computer store that also provides maintenance and service on a "time and materials" basis. Machines are repaired either within the plant, or taken to the store, fixed, and returned, depending on the problem. □

Checklist for Establishing Microcomputers in an Organization

- Identify initial microcomputer user.
- Identify microcomputer hardware to be evaluated.
- Identify application areas of interest.
- Establish microcomputer steering committee.
- Assign a senior MIS staff member for ongoing user support.
- Test hardware and software in user environment for adequate period of time, such as minimum of six months.
- Have steering committee evaluate user test.
- Establish microcomputer controls.
- Select hardware vendor.
- Expand microcomputer test into new users.
- Orient new users to microcomputer use.
- Have new users present progress reports.
- Develop steering committee evaluation.
- Have MIS department evaluation as a productivity/training aid.
- Present steering committee final review.
- Formalize role of microcomputers in the organization.

Source: James W. Tharrington, Case and Company Inc., Stamford, CT

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MICROGRAPHICS USAGE SURVEY

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It's a MIScrographics World

INFOSYSTEMS' 13th annual survey of micrographics usage shows MIS/DP has a commanding role in controlling, recommending equipment and designing systems.

By Wayne L. Rhodes, Jr.
Editor

The Management Information Systems/Data Processing (MIS/DP) function dominates the charts in INFOSYSTEMS' 13th annual survey of micrographics usage. An overwhelming 61.2 percent of the respondents said MIS/DP is in charge of the micrographics operation in their organizations. And 58.9 said MIS/DP recommends equipment purchases.

These findings emanate from an annual survey conducted on behalf of INFOSYSTEMS by Hitchcock Marketing and Research Services, Wheaton, IL. Hitchcock mailed 7,500 questionnaires last December and received a 26.6 percent return. Of the respondents, 24.7 percent said they presently use micrographics.

MIS/DP has the responsibility for designing micrographics systems in most instances. Almost 59 percent of the survey participants said MIS/DP designs their micrographics systems. The user group came in as designer at a distant 18.9 percent of the time and micrographics vendors do so 13 percent of the time.

Approval of expenditures for equipment broke out fairly evenly across a number of functions. MIS/DP has approval 41.2 percent of the time followed by President/Vice President/General Manager/Chief Executive Officer 33.6, financial management 27.7 and the user department 22.9.

Banking leads the field in industry usage of micrographics at 78.8 percent. Financial, government/military and utilities/communications all reported usage in more than 50 percent of the cases.

The larger the organization, the more likely it is to be using micrographics. Only 7.2 percent of organizations with one to 19 employees said they use micrographics. Over 61 percent of those with a thousand or more employees said they use micrographics. The usage rate grew with company size.

Archival storage is the main way micrographics are employed within organizations although active or daily reference scores well. Organizations use micrographics for archival storage 44.4 percent of the time; for active or daily reference 31.2 percent; and for semiactive reference 24.4 percent.

Thirty-six percent of the respondents said all of their micrographics needs are handled by an outside service organization. That compares with 24 percent who say they do all of their own work. Another 14.9 percent said they do most work in-house and 13.2 percent do most of theirs at a service bureau.

Usage of Micrographics by Industry

(Percentage)

Industry	Yes	No
1 Banking	78.8	21.2
2 Financial	53.6	46.4
3 Government/Military	51.6	48.4
4 Utilities/Communications	51.3	48.7
5 Transportation	48.4	51.6
6 Insurance	43.5	56.5
7 Service Organizations	31.5	68.5
8 Education	24.6	75.4
9 Manufacturing	21.6	78.4
10 Construction/Mining/Agric.	18.5	81.5
11 Retail/Wholesale	16.7	83.3
12 DP Service Organizations	12.1	87.9
13 Consultants	6.0	94.0
Total	24.7	75.3

Who Is in Charge

(Percentage)

1 DP Department	41.2
2 MIS	20.0
3 User Group	18.5
4 Records Manager	14.6
5 Office Service Staff	13.5
6 Micrographics Department	8.1
7 Systems Group	5.6
8 Other	12.3

*Totals to more than 100.0 percent due to multiple responses.

MICROGRAPHICS SURVEY

Computer-output micrographics (COM) dominated the kinds of outside services used. Almost 70 percent of respondents said they use outside services for conversion from magnetic media to film. Document filming was the other most widely used outside service at 41.2 percent. Processing and duplicating of film scored in the 25 percent range. Few use outside storage facilities.

Sixteen percent of respondents said they have in-house COM capabilities. Another 14.5 percent indicate they will bring in those capabilities during the next two years. Such a usage increase will almost double the COM marketplace to over 30 percent.

Computer-assisted retrieval (CAR) also shows good potential for growth. While 12.4 percent of the organizations use it in-house now, another 30 percent expect to bring it in within five years. Interestingly, 5.1 percent evinced no knowledge of the technology.

Most of the micrographics activity in at least one organization is being replaced by microprocessors and terminals, according to one response. That move typifies survey comments in which respondents seem to be intrigued by new technologies both within and without the micrographics field. Another person said their organization will be converting to a laser video disk system over the next

Who Designs the System(s)

	(Percentage)
1 DP Department	38.4
2 MIS	20.0
3 User Group	18.9
4 Systems Group	15.5
5 Vendor	13.0
6 Records Manager	11.6
7 Office Services Staff	10.5
8 Service Bureau	9.5
9 Micrographics Department	8.4
10 Engineering	5.5
11 Consultant	4.2
12 Other	6.5

*Totals to more than 100.0 percent due to multiple responses

Who Recommends the Equipment

	(Percentage)
1 DP Department	36.9
2 MIS	22.0
3 User Group	18.5
4 Office Services Staff	13.1
5 Service Bureau	12.7
6 Records Manager	10.8
7 Systems Group	9.7
8 Micrographics Department	9.5
9 Consultant	5.6
10 Purchasing Department	2.4
11 Other	6.9

*Totals to more than 100.0 percent due to multiple responses

Who Approves Expenditures

	(Percentage)
1 President/VP/GM/CEO	33.6
2 Financial Management	27.7
3 DP Management	25.2
4 User Department	22.9
5 MIS Management	16.0
6 Micrographics Department	4.4
7 Other	10.5

*Totals to more than 100.0 percent due to multiple responses

Micrographics Usage

	(Percentage)
1 Archival Storage	44.4
2 Active or Daily Reference	31.2
3 Semiactive Reference	24.4
	100.0

Percentage of Usage by Industry

Industry	Archival Storage	Active or Daily Reference	Semi-Active Reference
Banking	35.1	43.1	21.7
Financial	42.3	37.7	20.0
Government/Military	44.6	31.8	23.6
Utilities/ Communications	26.1	44.6	29.3
Transportation	46.4	34.3	19.3
Insurance	53.2	31.8	14.9
Service Organizations	51.0	24.2	24.8
Education	54.2	21.6	24.2
Manufacturing	46.4	34.3	19.3
Construction/ Mining/Agric.	40.5	23.5	36.0
Retail/ Wholesale	41.2	34.5	24.3
DP Service Organizations	41.6	28.3	30.1
Consultants	58.0	23.0	19.0

five years. And still another commented on the effect of technology on micrographics. "Our future use of micrographics will depend on the development of alternate technologies—optical disk, video disk and the like," the respondent said.

Micrographics, however, have not been replaced as the apple of everyone's eye. One person said, "Most users prefer hard copy for working paper, but like the reduced storage requirements of fiche." Another pointed out, "With increasing costs for paper, storage, and printing equipment plus increasing demands for security, COM systems are the way to go."

One respondent suggested INFOSYSTEMS try to determine why people microfilm. "We use it for legal cases and documents," this person emphasized. "In our company, we microfilm by necessity." □

How Micrographics Needs Are Handled

(Percentage)

1 All Handled by a Service Organization	36.0
2 All In-House	24.0
3 Most In-House	14.9
4 Most at a Service Organization	13.2
5 Equal Split In-House and Outside	12.0

Outside Micrographics Services Used

(Percentage)

1 Magnetic Media to Film Conversion (COM)	69.3
2 Filming Documents	41.2
3 Processing Film	26.6
4 Duplicating Film	24.6
5 Storage	7.3
6 Film to Paper Conversion	7.0
7 Magnetic Media to Paper Conversion	5.6
8 Other	2.0

*Totals to more than 100.0 percent due to multiple responses

Computer-Assisted Retrieval Systems (CAR) Usage

(Percentage)

Yes, Presently Use	12.4
No, But Plan to Use Within 1 Year	3.7
No, But May Use in 2 to 5 Years	27.7
No, and Do Not Plan to Use	49.5
Do Not Know What It Is	5.1
No Answer	1.6

Type of CAR Used

(Percentage)

1 Stand-Alone Retrieval Unit	55.7
2 Mainframe Controlled Unit	32.8
3 Both Stand-Alone & Mainframe	6.6
4 Other	3.3
5 No Answer	1.6

Plans for 1983

(Percentage)

1 Maintain Present Systems	63.9
2 Expand	24.8
3 Expand and Replace	7.6
4 Replace Present Systems	3.8

COM Usage In-House

(Percentage)

Yes	16.1
No, But Plan to Have Within 2 Years	14.5
No, and Do Not Plan to Have	68.2
No Answer	1.2

Growing Uses for Micrographics

	Today Percent Total	2 Years from Now Percent Total
Filming Correspondence	34.8	40.5
Microfacsimile	12.6	17.9
Computer Assisted Graphics on Micro	9.3	17.9
Computer Input Micrographics	6.6	10.8
Word Processors Outputting to COM	5.1	21.2
Merging Text & Graphics on Micro	6.4	12.8
Electronic Mail Outputting to COM	1.5	12.5

Complete Report Available

Spiral-bound copies of the complete survey are available for $50. This shows a detailed breakdown by industry for each of the 18 questions asked on the survey.

Check or company purchase order must accompany all orders. Mail request to: INFOSYSTEMS Micrographics Survey, Research Department, Hitchcock Publishing Co., Hitchcock Building, Wheaton, IL 60187.

For an extra copy of this article please enter No. 24 on the Reader Information Card

BEST AVAILABLE COPY

Operations Manager Earns Highest Micrographics Salary

The highest salary reported in INFOSYSTEMS' sixth annual survey of micrographics staff belongs to the operations manager of a micrographics center. That salary, $885 per week, contrasts markedly with the lowest salary in the same category, $279.

The study results are based on 297 responses drawn from a mix of different industries and spread across nine job titles. In virtually every job category a significant difference was reported between the highest and lowest salaries. For instance, in the narrowest separation rotary/planetary camera operator, the range varied from $134 to $327, a $193 per week difference.

The following jobs were surveyed.

Operations Manager, Micrographic Center. Plans, organizes and oversees all activities of the micrographic center through managing subordinates or by direct supervision.

Production or Laboratory Shift Supervisor (or leader), Micrographic Center. Responsible for the center's production operations on one shift.

COM Operator, Senior. Responsible for the complete operation of the COM equipment including job setup.

COM Operator, Junior. Operates the COM equipment under general supervision according to predetermined production schedules, quality standards, device capabilities and tape formatting requirements.

Micrographics Laboratory Technician. Fully experienced in basic wet process silver film technology.

Micrographics Processing Technician. Sets up, controls, adjusts and operates automated micrographic processors and duplicators, either one or both types.

Rotary/Planetary Camera Operator. Sets up, loads and operates a rotary or planetary camera for recording source documents on microfilm.

Micrographic Duplicating Technician. Operates one or more micrographic duplicators to produce roll-to-roll film, microfiche or aperture cards.

Micrographic Production Clerk. Receives, logs in, prepares and distributes documents to be microfilmed.

For a copy of the complete job descriptions used in the salary survey, **Enter No. 5** on the Reader Information Card at the back of this issue.

Weekly Salaries For All Micrographic Jobs: Nationwide

	Lowest Reported Actual Salary	25th Percentile* Actual Salary	National Average Actual Salary	Median* Actual Salary	Mode* Actual Salary	75th Percentile* Actual Salary	Highest Reported Actual Salary	Established Salary Range Average Low	Established Salary Range Average High
Operations Manager Micrographics Center	$279	$400	$484	$474	$415	$574	$885	$415	$579
Production-Lab Shift Supervisor (or Leader)	192	267	364	346	385	476	554	297	442
COM Operator, Senior	104	260	302	321	340	381	646	264	368
COM Operator, Junior	175	211	285	313	346	346	508	248	351
Micrographics Lab Technician	173	254	305	308	308	327	501	230	327
Micrographics Processing Technician	156	234	267	250	250	308	454	228	309
Rotary Planetary Camera Operator	134	185	217	212	212	244	327	203	269
Micrographics Duplicating Technician	140	193	230	208	269	269	373	204	283
Micrographics Production Clerk	140	175	217	210	269	267	400	186	256

*25th Percentile: That point at which 25 percent of all other salaries are lower and 75 percent are higher

*Median: A figure having an equal number above and below

*Mode: The salary reported most often

*75th Percentile: That point at which 75 percent of all other salaries are lower and 25 percent are higher

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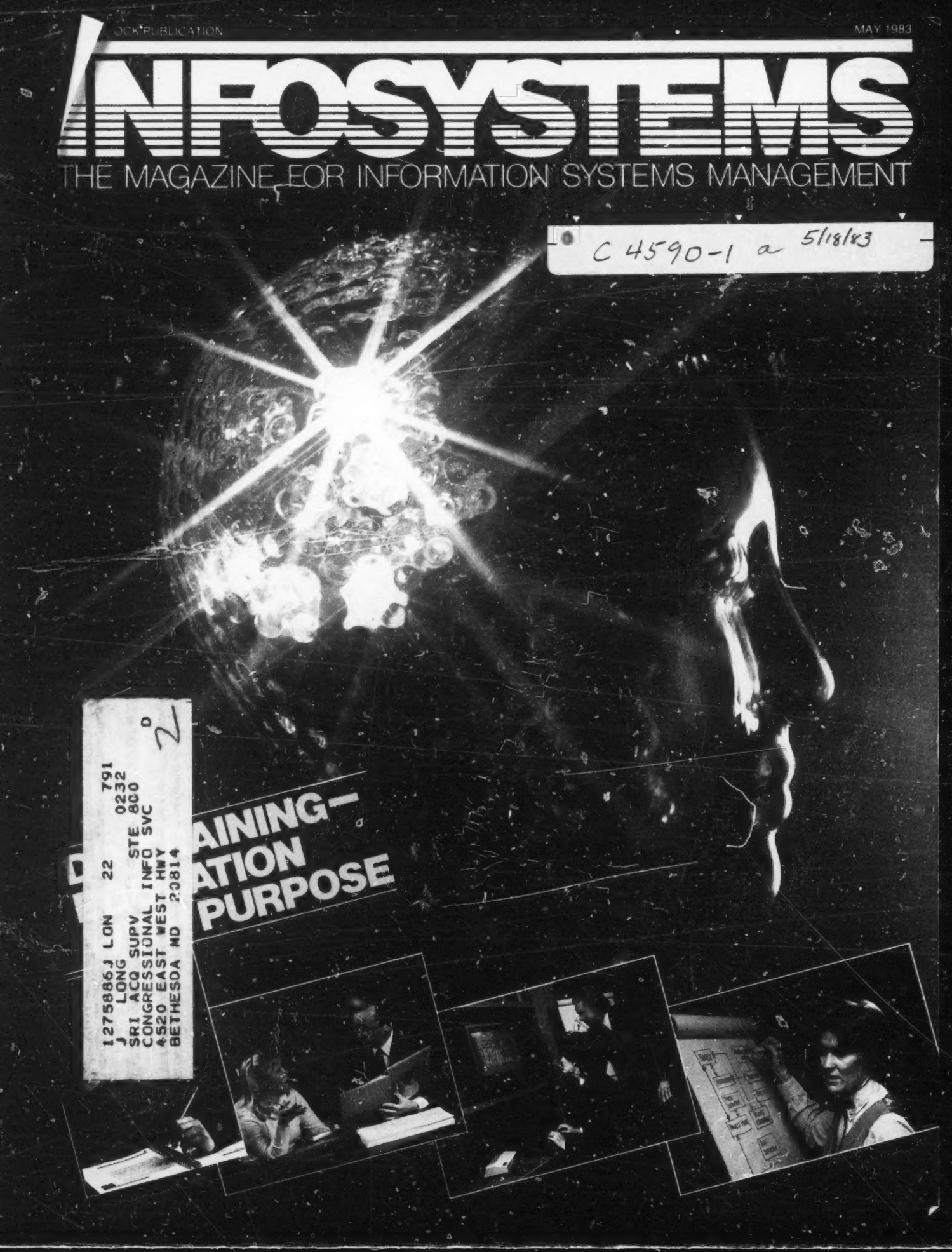

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Trends

Network taking over mainframe's role as backbone

The backbone of the modern information system is no longer the mainframe computer. The communications network that ties together the information system and connects it to the external world has assumed that importance. This assessment comes from international management consultants, The Diebold Group Inc., New York City.

Diebold surveyed 100 major corporations and found Management Information Systems (MIS) undergoing changes which reflect a new order to the world. MIS faces increasing involvement in operations and support of distributed computing equipment outside its own once highly centralized domain.

Diebold believes this move outward is turning MIS into a "high technology" arena. That is, MIS now needs much higher skills levels, but in a variety of areas besides just computer operations.

Information processing has become more dependent on microcomputers, distributed processors, small business systems and telecommunications. It is somewhat less dependent on large central processors than in the past, according to Diebold. These changes force greater emphasis on capacity planning, performance monitoring, technical support, security and facilities management.

Half of the respondents to Diebold's survey anticipate more than 100 percent growth in dispersed computing equipment. Three-quarters either currently support or plan to support computer equipment located outside their central operations. And they are prepared to provide other operations-related consulting activities.

Diebold sees unprecedented growth in telecommunications. Interactive and on-line transaction processing will grow sharply in the next two years. Batch processing will decline as a percentage of the workload.

Diebold expects costs of providing operating systems and system management software to increase 17 percent per year during the same two-year period. They will consume five percent of the overall operations budget in large corporations by 1985.

Operations headcount will grow at a four percent annual rate as compared to a five percent rate projected for MIS overall. Survey results show headcount associated with data entry activities will decrease eight percent per year.

Hardware and operations personnel costs as a percentage of overall MIS budget will continue to decline one percent per year, Diebold predicts. This continues a trend in effect since 1971, the firm reports.

—WLR

Major Changes in Computer Operations by 1985 Indicated by Diebold Group Survey

Organization Size	Workload Profile: $1 to $10 Million Medium			Workload Profile: Over $10 Million Large		
Workload:	% Effort 1982	% Effort 1985		% Effort 1982	% Effort 1985	
• Interactive	9	15	33 / 49	14	20	32 / 46
• On-Line Transaction	24	34		18	26	
• Batch	48	33		49	36	
• Other	19	18		19	18	

Source: The Diebold Group, Inc.

Software

Buyer should look at more than just program

Software vendors continue to sell their products, but the real product a user should evaluate involves more than just a set of programs. This advice comes from Frank Dodge, president of McCormack & Dodge Corp., a leading software products vendor itself. He told attendees at Software/expo-East in New York City to look at several elements before buying a package.

Dodge's foremost point to evaluate consists of the company itself. Look at its stability, its financial position, its history and its environment, he said.

That company should have a full set of integrated applications systems which it markets. Those systems should have standardized and user-friendly documentation. There should be strong on-line customer training capabilities, both centrally located and at customer sites.

Dodge stressed that the buyer evaluate the vendor's applications expertise to provide all the support and enhancements the users want and "deserve." "The vendor must have the ability to enhance products beyond current stages," he emphasized. "What this requires is the input from a sizeable user base and the vendor's ability to make use of this input."

Most important for the future, according to Dodge, are the vendor's ability and resources to do the kinds of research users will demand. That research will also be required by the industry itself, he contended, during the next four to five years to take advantage of the tremendous changes that have been made in the technology and which will continue to be made.

"As you can see, the product to both vendor and user has become much more than just a set of programs," Dodge said.

—WLR

Court prohibits copying of Basic Four's software

The Federal District Court of Idaho has halted the "modifying, copying or tampering" of the operating system for Basic Four computers by Hubco Data Products Corp., according to Management Assistance Inc. (MAI), parent company of Basic Four. Hubco formerly was a Basic Four dealer.

. . . *continued on page 24*

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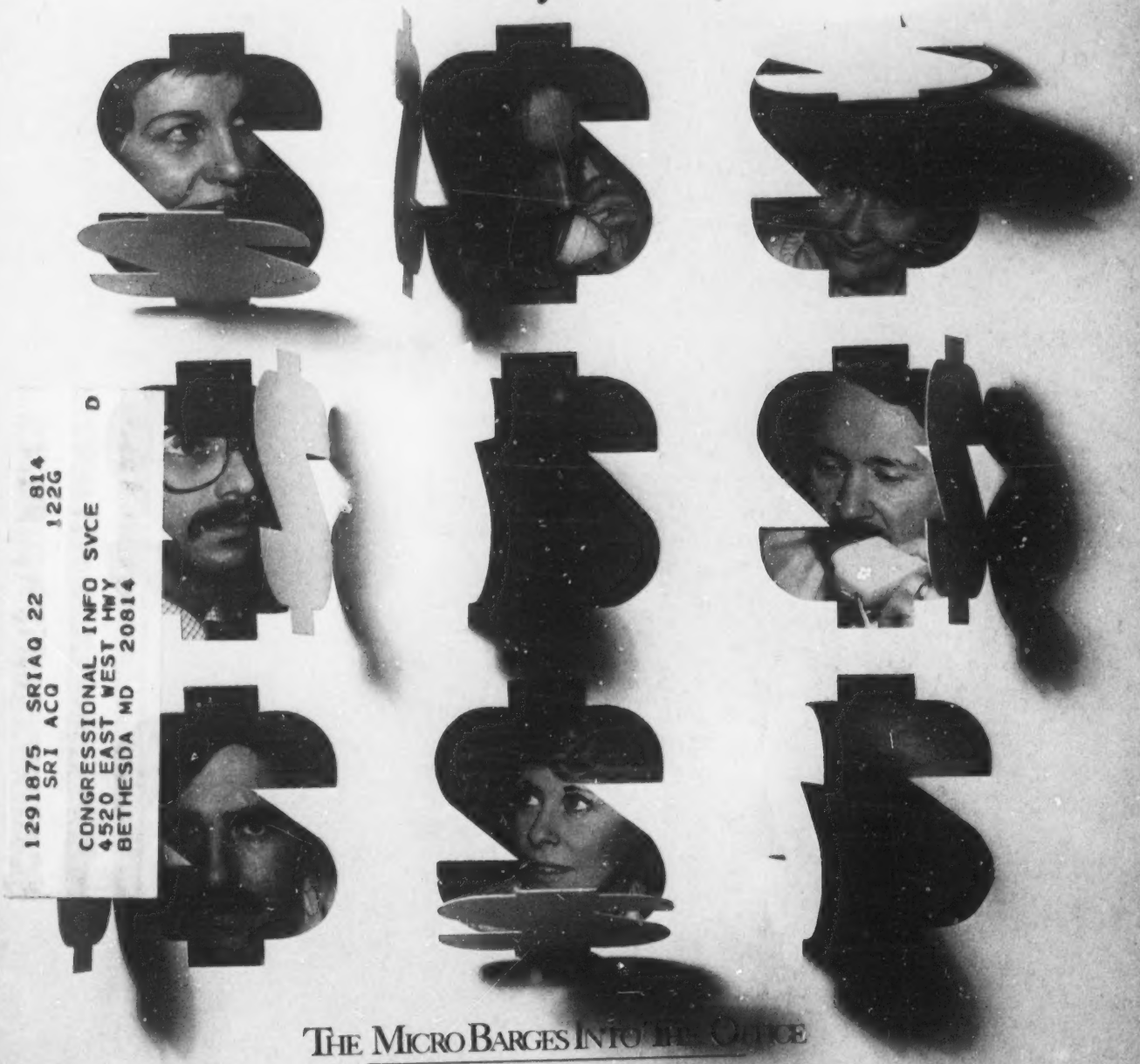
25th Annual DP Salary Survey



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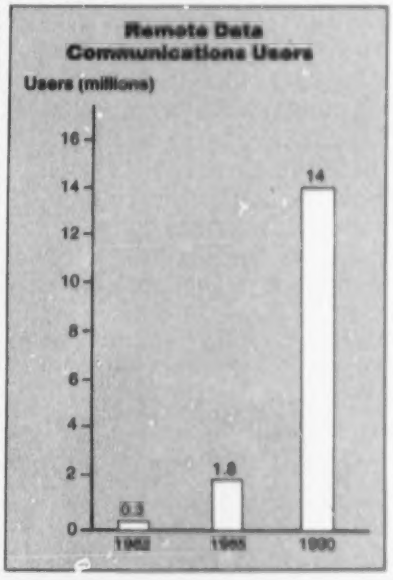
develop computer software for their own use or for sale to others. Sussman urges companies to express their opinions about the proposal to the IRS and to their legislators. The IRS changed proposed regulations before in response to serious public outcry. He also says, "It is imperative that companies establish specific recordkeeping procedures to prove the eligibility of their expenditures for the credit."

Thirty-seven members of Congress have co-signed a letter to Donald T. Regan, secretary of the Treasury, calling for "modification of the Internal Revenue Service's proposed amendments to Sections 174 and 44F of the IRS Regulations." Jerome L. Dreyer, president of the Assn. of Data Processing Service Organizations, which has led efforts to modify the proposals, stated, "We are pleased to see support for our position expressed by so many respected members of Congress." —CTT

Info Industry

Micro growth rate to accelerate due to communications

Data communications will be one of the leading factors that drives the sales growth and use of microcomputers in the 1980s, according to a recently released study from Enlon Assoc. Conversely, the growing user base for microcomputers will spur the sale of datacomm applications.



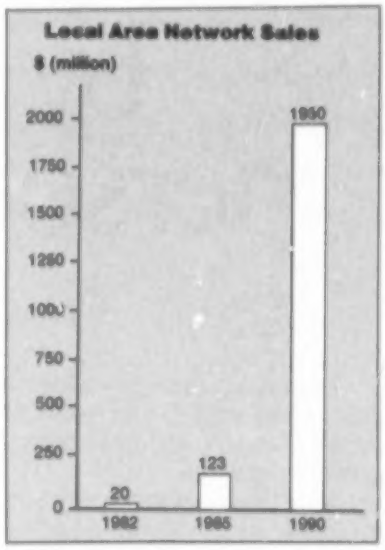
"There is a synergism between these two market areas—microcomputers and datacomm—with each causing the other to grow in somewhat of a snowball fashion," says Brant Corensen, president of Enlon.

Corensen identifies local area networks (LAN) as one of the most popular datacomm applications for micros in this decade. He says the key impetus behind LAN sales growth will be the rapidly increasing acquisition of workstations.

"We will see a sizeable growth of microcomputers due to the fact that people want to talk to an information base," says Corensen. "With micros getting cheaper and cheaper, people will buy them to use as workstations for building local area networks."

Corensen's firm predicts that microcomputer sales will be worth $20 billion by 1990, bringing the installed base of units to over 100 million. Of those systems, microcomputer-based workstations should account for the most significant share of the market, with sales expected to rise to over four million units by the end of the decade.

Corensen predicts that remote data services will also become more significant in the purchase decision of micros during the next seven years, since vendors will be offering more extensive and sophisticated options. In the short term, the group of customers most interested in outside information sources will be businessmen. But eventually, this customer base will expand to include home users who will find appeal in special interest newsletters, extensive financial and shopping services, and new modes of entertainment such as interactive games and chain stores. —WLM



Gnostic predicts vigorous growth for small systems

The next two to five years will be a period of vigorous growth for the small systems business, particularly for the personal/professional workstations and terminals market, says Gnostic Concepts.

According to Bob Katzive, vice president of the California-based research firm, the total US production of terminals and workstations should grow at an average annual rate of 20.4 percent over the next five years to become a $24.4 billion market by 1987.

Katzive believes a key in this market growth will be the impact of the new industry-standard operating systems such as Unix, Pick, Forth and Ada, which will transform the small systems market into a commodities market. There the differences between competitive systems become minimal in the eyes of the user. Also contributing to this growth will be the "seamless" software systems such as Lisa and Visi-On which cause the computer novice to accept the systems more readily.

"I wish you weren't so insistent about retaining your original equipment. Ever try to set up a keyboard-to-abacus system?"

As hardware and software prices continue to decline, the research firm expects shipments of single-user Unix systems to surpass those of multiuser Unix systems by 1987.

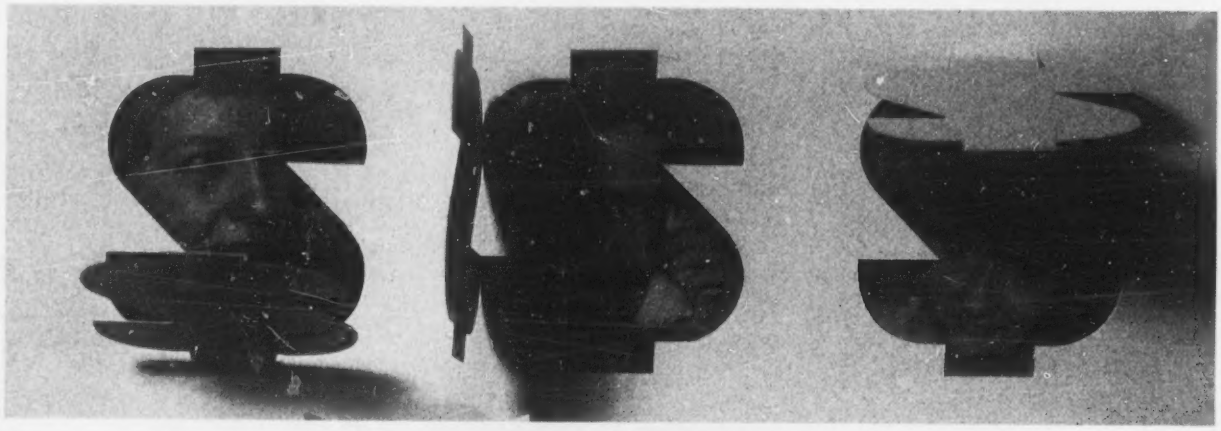
"The basic organization of Unix makes it so efficient in communications roles that we'll see more and more of it in the business environment in direct proportion to its affordability," says Katzive.

Katzive also predicts that the dominance of computationally intensive applications will cause shipments of 32-bit microcomputers to surpass those of 16-bit systems by 1989. —WLM

. . . *continued on page 30*

In Line with the Times

The recession has had its impact on salaries and staffing among respondents to INFOSYSTEMS' 25th annual DP Salary Survey.



By Wayne L. Rhodes, Jr., Editor
and Raymond S. Winkler
Senior Market Research Specialist

Data processing (DP) salaries increased 5.1 percent from 1982 to 1983, according to the findings in INFOSYSTEMS' 25th annual salary survey. This increase compares to a four percent rise shown in last year's survey. Some jobs reported decreases in salaries this year, but in most cases these were ones that showed large increases in 1982.

The survey draws its conclusions from some 1,254 responses to a questionnaire mailed in January on behalf of INFOSYSTEMS by Hitchcock Marketing & Research Services, Wheaton, IL. The respondents reported on salaries for 12,992 individuals.

The results this year reflect the recession that has been affecting US business and industry for some time. Respondents commented about the effect of recession-era personnel policies on their answers to the questionnaire.

"We have recently ended a 12-month salary freeze," one respondent said. "Hiring is on an 'as needed' basis only."

Another said his firm has had a salary freeze and a hiring freeze for a year. "Maybe July will end both and maybe not," he ruefully commented.

A third respondent noted that his or-

Percentage of 1982 Budget For:
(By Equipment Rental Range)

Rental Range Per Month	Outside Services	Software	Hardware (and Maintenance)	Personnel	Supplies	Other
Under $3,000	6.7	7.5	27.5	46.6	9.0	2.7
$3,000 to $4,499	3.7	6.0	29.0	48.0	10.3	3.0
$4,500 to $5,999	4.3	7.8	29.1	45.2	8.3	5.3
$6,000 to $8,999	5.2	7.0	31.3	44.4	8.4	3.7
$9,000 to $11,999	5.3	7.3	32.9	41.1	9.1	4.3
$12,000 to $14,999	3.6	6.0	32.7	44.4	8.8	4.5
$15,000 to $17,999	4.8	6.6	30.9	44.7	8.4	4.6
$18,000 to $24,999	5.8	7.6	33.5	41.9	7.2	4.0
$25,000 to $49,999	5.9	6.5	34.0	41.8	7.3	4.5
$50,000 to $74,999	3.6	7.6	36.5	40.7	8.1	3.5
$75,000 to $99,999	2.8	7.2	32.8	46.5	5.9	4.8
$100,000 to $149,999	8.1	8.3	30.2	43.8	5.6	4.0
$150,000 or more	8.1	8.7	36.7	38.8	4.0	3.7
Not available	5.0	7.1	29.9	45.2	9.0	3.8
Total	5.2	7.1	31.1	44.3	8.4	3.9

This probably indicates companies have scaled back their hopes of filling some of their vacancies . . .

ganization's two unfilled positions are a result of cutbacks in the DP budget. "Once the economy picks up it is expected that these positions would again be filled," he said.

Comments set tone

These comments set the tone of the latest findings of the quarter-century-old survey. Almost a fourth of the companies reported unfilled programmer positions on their staffs. This compares with less than a fifth last year. Interestingly, whereas last year the respondents had almost three positions vacant, this year the number was much closer to two (2.9 to 2.1). This probably indicates that companies have scaled back their hopes of filling some of the vacancies and may have eliminated positions altogether.

The number of respondents reporting vacancies in the systems analyst position was virtually the same as last year, up slightly from 13 to 14 percent. A trend downward in number of positions vacant was noticeable although not nearly so sheer as that in the programmers area. The number of positions dropped from 2.3 to 2.1.

In a related area, the average length of employment for programmers and systems analysts had one significant figure. While programmers' average length of employment went up from 35.8 months to 36.2, there was a precipitous drop in the length of employment for systems analysts. This figure dropped from 48.9 months in 1982 to 37.7 in 1983—a year.

Budget allocations consistent

A look at the last five years' findings in the survey shows no major changes in DP budget allocation. In 1979, the salary survey reported that 29.6 percent of the budget went for hardware and maintenance. The 1983 figure comes in at 31.1 percent.

In 1979, personnel consumed 43.8 percent of the DP budget. In 1983, that figure reads 44.3 percent. Most of the other budgetary areas show similar consistency. There is a slight increase in software costs accompanied by a slight drop in the use of outside services, but nothing to base a prediction on.

Trend data accumulated from the past five surveys shows that the financial officer still holds sway over the DP manager in most cases. Nearly 40 percent of the respondents in 1983 say DP falls under the auspices of the financial function. The president, owner or general manager of the concern is the next most cited, but this comes clearly from smaller organizations.

In the larger shops, the DP manager reports to the director of Management Information Systems (MIS) to a much higher extent than is true among smaller shops. Smaller organizations probably don't even have an MIS title.

These findings of whom DP reports to have held constant over the five years sampled. It should be noted that a vice president title does crop up more often than an MIS one as having responsibility.

Commanding control

In functional areas, the DP/MIS titles hold a commanding edge in control over data communications. In 1979 when director of information systems was not included as an option, DP manager was named 79.4 percent of the time as the person responsible for datacomm. In 1983, combining the responses for DP and MIS, the figure comes in at 81.2 percent. A breakout of the numbers shows DP in charge 60.5 percent of the time and MIS 20.8 percent.

Data accumulated from the past 5 surveys shows the financial officer still holds sway over the DP manager . . .

The person responsible for datacomm reports to the DP manager 26.7 percent of the time and to the MIS director 22.7 percent. The next most mentioned person in charge of datacomm is the president, owner, general manager.

Number of Employees in DP vs. Company
(By Equipment Rental)

Rental Range Per Month	Average Number In DP	Average Number In Company
Under $3,000	3	187
$3,000 to $4,490	4	264
$4,500 to $5,999	5	453
$6,000 to $8,999	8	576
$9,000 to $11,999	9	944
$12,000 to $14,999	10	791
$15,000 to $17,999	12	801
$18,000 to $24,999	15	1,170
$25 000 to $49,999	32	2,073
$50,000 to $74,999	37	2,108
$75,000 to $99,999	43	1,755
$100,000 to $149,999	74	4,587
$150,000 or more	207	5,883
Not available	7	499
TOTAL	18	1,015

Data Base Management Reports to:

Data Processing Manager	29.9%
Director of Information Systems (MIS)	25.7%
Financial Officer/ Controller	17.9%
President, Owner, General Manager	14.4%
Vice President	4.0%
Other	8.1%

Data Processing Reports to:

Financial Officer/ Controller	39.6%
President, Owner, General Manager	31.3%
Vice President	13.4%
Director of Information Systems (MIS)	7.2%
Other	8.5%

Have Person With Title of EDP Auditor

Yes	8.0%
No	92.0%
TOTAL	100.0%

REVENUES AND OPERATING BUDGET vs. DP BUDGET (By Industry)*

Industry	Average Operating Budget($)	Average Total Revenues($)	Average DP Budget($)	% of Budget	% of Revenue
Advertising, Printing, Publishing	26.320	32.325	.901	3.42	1.23
Banking, Financial	51.599	128.711	2.336	4.52	2.49
Educational	38.535	96.528	1.096	2.84	1.14
Engineering-Construction	42.750	540.900	.470	1.10	.09
Gov't Agencies (Fed., State, City)	50.221	76.535	.386	.77	.50
Hospital-Health Care	46.244	49.985	.538	1.16	1.08
Insurance	32.365	282.325	1.800	5.56	.64
Public Utilities	248.516	332.021	4.723	1.90	1.42
Retail Sales & Distribution	38.756	132.323	.617	1.59	.47
Service—Data Processing	1.746	2.162	1.131	64.74	52.28
Service—Other than DP	15.864	23.039	.362	2.28	1.57
Transportation	113.266	116.507	.610	.54	.52
Wholesale Sales & Distribution	47.258	81.123	.520	1.10	.64
Manufacturing and Processing					
Electrical, Electronic	65.754	71.590	.724	1.10	1.01
Food, Tobacco, Drugs	24.882	44.542	.437	1.76	.98
Machinery, Instruments, Equipment	17.375	39.810	.496	2.85	1.25
Metal Producing and Fabricating	30.265	46.116	.668	2.21	1.45
Apparel, Textiles	27.230	33.949	.397	1.46	1.17
Lumber, Wood, Furniture, Paper	126.000	116.533	1.011	.80	.87
Chemicals, Petroleum, Coal	130.225	155.058	.961	.74	.62
Rubber, Leather, Glass or Clay Products	43.260	49.138	.528	1.22	1.07
Other	16.650	24.400	.222	1.33	.91
Total	45.924	98.370	.926	2.02	.94

*DP Service Organizations are shown above, but are not included in the "Average For All Industries" so as to not distort the results. DP budgets for DP Service Organizations typically represent a high percentage of their total company operating budget and revenues.

* (in millions)

No trends were evident in the number of DP budgets that include user department systems. In 1980, 30.1 percent responded yes and in 1983, 28.5 percent said yes.

The percentage of companies using a distributed processing concept has reached the 30 percent level now. This compares to 23.4 percent in 1979. One respondent said "most of the day-to-day responsibilities have been pushed out to our division, hence the very small group at our corporate headquarters." (IN)

Data Communications Reports to:

Data Processing Manager	26.7%
Director of Information Systems (MIS)	22.7%
President, Owner, General Manager	14.0%
Vice President	5.8%
Financial Officer Controller	7.6%
Other	23.3%

Person Responsible for Data Communications

Data Processing Manager	60.5%
Director of Information Systems (MIS)	20.8%
Communications Manager	5.1%
Other	13.6%

Job Descriptions Available

Detailed job descriptions for the 35 DP positions surveyed are available free of charge. For a copy **Enter No. 21** on the Reader Information Card.

Additional Reprints

Additional copies of the DP Salary Survey in this issue are available for $5 each. In quantities of 10 or more, the cost is $4.50. Send your check or company purchase order to the Salary Reprint Department, INFOSYSTEMS, Hitchcock Building, Wheaton, IL 60187.

Weekly Salaries for All Infosystems Jobs: Nationwide and by Size of Installation

Job Description	Job Code	NATIONAL STATISTICS: Number Reported	Lowest Reported Actual Salary	25th Percentile* Actual Salary	National Average Actual Salary	Median* Actual Salary	Mode* Actual Salary	75th Percentile* Actual Salary	Highest Reported Actual Salary	Established Salary Range—Average Low	Established Salary Range—Average High	AVERAGE SALARY—BY EQUIPMENT RENTAL RANGE: Under $3,000/Mo.	$3,000-4,499/Mo.	$4,500-5,999/Mo.	$6,000-8,999/Mo.	$9,000-11,999/Mo.	$12,000-14,999/Mo.	$15,000-17,999/Mo.	$18,000-24,999/Mo.	$25,000-49,599/Mo.	$50,000-74,999/Mo.	$75,000-99,999/Mo.	$100,000-149,999/Mo.	$150,000 and over
MANAGEMENT												(165)	(136)	(126)	(159)	(98)	(86)	(62)	(84)	(130)	(37)	(22)	(18)	(29)
Top MIS Official	(01)	240	561	805	959	942	961	1,076	1,827	779	1,139	968	857	770	815	895	872	919	966	1,037	1,107	1,053	1,066	1,140
Data Base Systems	(02)	77	346	538	648	617	538	704	1,194	551	797	**	**	521	**	638	**	**	670	614	647	585	678	838
Data Processing	(03)	930	288	567	670	673	769	769	1,269	570	800	522	597	625	646	653	723	726	740	738	801	794	838	929
Ass't D.P.	(04)	127	230	527	627	634	576	745	1,019	513	733	476	536	522	497	519	671	568	655	632	682	669	818	778
Project/Team Leader																								
Leader	**(05)**	**332**	**340**	**557**	**656**	**634**	**576**	**730**	**1,250**	**532**	**755**	**521**	**581**	**608**	**609**	**570**	**616**	**806**	**597**	**624**	**658**	**635**	**641**	**721**
Systems Analysis and Programming																								
Manager/Supervisor	(06)	368	276	596	691	681	576	769	1,346	567	807	591	**	602	630	633	600	669	660	689	680	794	813	734
Lead	(07)	485	295	500	567	567	596	628	961	467	655	578	520	537	504	498	536	568	54[illegible]	576	537	543	615	606
Senior	(08)	988	301	461	515	510	538	576	1,005	438	620	464	467	459	494	494	499	511	503	537	496	499	531	539
Junior	(09)	655	210	346	408	403	480	475	784	359	513	416	377	394	375	347	403	416	412	419	427	392	425	402
Systems Analysis																								
Manager/Supervisor	**(10)**	**54**	**384**	**576**	**688**	**679**	**673**	**786**	**1,059**	**572**	**835**	**	**	**	**659**	**	**663**	**603**	**	**701**	**666**	**	**810**	**813**
Lead	**(11)**	**66**	**421**	**560**	**609**	**600**	**576**	**645**	**923**	**503**	**699**	**596**	**	**	**520**	**557**	**544**	**584**	**580**	**591**	**636**	**624**	**658**	**717**
Senior	**(12)**	**182**	**346**	**510**	**570**	**565**	**538**	**625**	**841**	**450**	**666**	**538**	**	**509**	**514**	**5[illegible]9**	**503**	**529**	**560**	**559**	**545**	**597**	**579**	**687**
Junior	**(13)**	**129**	**250**	**446**	**513**	**516**	**538**	**576**	**756**	**398**	**592**	**	**	**382**	**	**518**	**501**	**	**	**472**	**500**	**410**	**517**	**578**
Systems Programming																								
Manager/Supervisor	(20)	99	244	588	669	668	634	769	961	558	804	**	**	542	595	**	552	597	**	670	670	707	774	820
Lead	(21)	99	230	500	579	516	576	650	923	474	677	481	518	537	482	**	528	595	612	548	593	630	657	6[illegible]6
Senior	(22)	255	184	470	526	526	480	588	744	444	647	410	499	492	439	498	486	499	558	530	521	580	629	560
Junior	(23)	146	161	368	430	442	480	484	692	358	529	361	322	347	373	365	333	403	442	453	473	544	544	466
Trainee	(24)	40	245	307	345	330	323	365	563	316	459	**	289	284	321	**	319	325	326	347	323	402	403	367
Applications Programming																								
Manager/Supervisor	**(25)**	**107**	**322**	**557**	**618**	**615**	**576**	**673**	**949**	**524**	**758**	**571**	**	**604**	**	**581**	**591**	**635**	**614**	**655**	**625**	**	**733**	**626**
Lead	**(26)**	**171**	**200**	**468**	**524**	**521**	**468**	**600**	**800**	**434**	**624**	**428**	**513**	**514**	**501**	**462**	**524**	**537**	**538**	**544**	**598**	**	**	**507**
Senior	**(27)**	**652**	**138**	**394**	**452**	**446**	**461**	**504**	**896**	**386**	**549**	**484**	**399**	**450**	**439**	**444**	**455**	**450**	**470**	**441**	**480**	**492**	**491**	**443**
Junior	**(28)**	**635**	**173**	**323**	**364**	**365**	**387**	**400**	**792**	**323**	**450**	**316**	**333**	**356**	**333**	**346**	**365**	**352**	**375**	**370**	**364**	**369**	**400**	**373**
Trainee	**(29)**	**159**	**154**	**275**	**308**	**302**	**300**	**346**	**461**	**272**	**382**	**295**	**274**	**306**	**253**	**306**	**266**	**305**	**325**	**308**	**333**	**323**	**360**	**298**
Data Communications																								
Manager	(30)	39	300	510	619	621	653	720	856	515	721	**	**	556	**	**	586	**	634	611	552	**	635	703
Operator	(31)	65	175	286	367	344	355	400	788	309	453	**	249	**	**	**	327	**	**	319	348	**	390	437
Computer Operations																								
Manager/Supervisor	**(32)**	**452**	**193**	**384**	**488**	**472**	**461**	**576**	**1,076**	**436**	**622**	**384**	**414**	**389**	**416**	**467**	**434**	**495**	**505**	**517**	**563**	**594**	**588**	**615**
Lead Operator	**(33)**	**592**	**175**	**288**	**358**	**346**	**346**	**41[illegible]**	**730**	**304**	**428**	**289**	**299**	**308**	**318**	**318**	**332**	**336**	**377**	**352**	**392**	**402**	**512**	**441**
Senior Operator	**(34)**	**1,026**	**150**	**275**	**325**	**310**	**346**	**362**	**903**	**274**	**381**	**286**	**282**	**295**	**292**	**294**	**312**	**317**	**322**	**319**	**329**	**367**	**446**	**359**
Junior Operator	**(35)**	**912**	**126**	**230**	**271**	**267**	**230**	**307**	**729**	**230**	**325**	**260**	**223**	**261**	**264**	**249**	**254**	**240**	**273**	**270**	**284**	**265**	**339**	**296**
I/O Control Manager	**(36)**	**175**	**160**	**255**	**333**	**307**	**250**	**398**	**634**	**294**	**425**	**260**	**269**	**305**	**269**	**362**	**270**	**317**	**334**	**330**	**358**	**381**	**427**	**438**
Tape Librarian	**(40)**	**128**	**160**	**236**	**282**	**270**	**230**	**311**	**500**	**232**	**330**	**	**213**	**210**	**251**	**250**	**289**	**267**	**307**	**262**	**271**	**283**	**380**	**274**
Key Entry																								
Supervisor	(41)	229	138	279	330	323	346	368	615	287	405	286	315	2[illegible]1	300	368	317	315	321	340	332	367	363	327
Lead Operator	(42)	388	172	237	274	269	250	300	480	228	324	255	269	275	286	271	258	276	295	281	278	356	267	256
Senior Operator	(43)	1,207	115	220	253	250	230	282	439	212	289	228	234	236	265	26[illegible]	253	242	257	264	239	256	239	249
Junior Operator	(44)	615	115	185	222	214	230	242	428	194	266	222	202	234	213	223	221	200	201	238	238	255	227	209

(No. Firms)

* *Median—A figure having an equal number above and below* * *Mode—The salary reported most often* * *25th Percentile—That point at which 25% of all other salaries are lower and 75% are higher* * *75th Percentile—That point at which 75% of all other salaries are lower and 25% are higher*

** Indicates insufficient information available

Average Reported Weekly Salaries for All Infosystems by Industry

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY INDUSTRY

Manufacturing and Processing

Job Description	Job Code	Advertising, Printing & Publishing	Banks, Financial	Educational	Engineering, Construction	Government Agencies	Hospital, Health Care	Insurance	Public Utilities	Retail Sales & Distrib.	Data Proc. Service Centers	Other Services (non-DP)	Transportation	Wholesale Sales & Distrib.	Electrical, Electronic	Food, Tobacco, Drugs	Machinery, Instruments, Comb.	Metal Products & Fab.	Apparel, Textiles	Lumber, Wood, Furn., Paper	Chemicals, Petro, Coal	Rubber, Leather, Glass, Clay	Other
		(29)	(48)	(80)	(36)	(104)	(49)	(50)	(10)	(57)	(60)	(97)	(27)	(89)	(51)	(38)	(68)	(107)	(23)	(18)	(43)	(38)	(53)
MANAGEMENT																							(No. Firms)
Top MIS Official	(01)	1,009	1,091	822	1,088	838	873	996	1,393	920	987	944	1,078	891	907	1,018	902	902	1,003	1,143	1,021	**	965
Data Base Systems	(02)	**	527	534	**	707	609	**	650	678	854	604	807	609	610	827	**	632	**	**	607	**	**
Data Processing	(03)	730	718	640	698	692	686	706	768	630	693	608	777	631	661	673	628	696	658	703	703	633	640
Ass't D P	(04)	**	636	550	**	**	545	639	**	487	541	521	608	517	**	634	**	619	**	**	578	**	548
Project/Team Leader																							
Leader	**(05)**	**616**	**716**	**619**	**	**571**	**543**	**647**	**699**	**646**	**786**	**737**	**729**	**615**	**701**	**681**	**563**	**747**	**701**	**	**591**	**634**	**612**
Systems Analysis and Programming																							
Manager/Supervisor	(06)	737	717	701	665	670	620	664	774	666	727	660	731	582	755	729	630	754	781	694	723	736	654
Lead	(07)	518	554	527	574	571	504	545	581	573	628	575	578	551	548	551	593	711	**	644	582	574	480
Senior	(08)	500	544	487	558	509	459	461	496	533	523	527	542	510	505	516	522	593	587	523	510	491	463
Junior	(09)	416	427	413	325	404	393	384	449	419	454	407	437	407	435	380	429	375	**	395	440	377	389
Systems Analysis																							
Manager/Supervisor	**(10)**	**	**716**	**	**	**819**	**713**	**698**	**	**	**658**	**	**	**662**	**684**	**	**713**	**	**682**	**	**654**	**	**684**
Lead	**(11)**	**	**	**	**	**624**	**599**	**614**	**	**599**	**614**	**	**	**648**	**624**	**701**	**620**	**	**	**573**	**580**	**	**
Senior	**(12)**	**	**631**	**490**	**	**515**	**516**	**546**	**	**530**	**493**	**588**	**	**534**	**555**	**699**	**607**	**588**	**519**	**520**	**	**	**550**
Junior	**(13)**	**	**436**	**	**	**378**	**453**	**514**	**	**480**	**471**	**410**	**461**	**	**477**	**580**	**	**497**	**	**	**524**	**	**
Systems Programming																							
Manager/Supervisor	(20)	632	739	571	**	661	603	699	**	668	539	**	**	682	708	758	**	724	**	**	689	**	653
Lead	(21)	550	621	522	**	534	559	569	627	576	**	589	747	647	641	646	**	583	542	575	564	**	**
Senior	(22)	526	606	510	**	489	504	522	565	529	531	427	572	534	522	490	527	520	518	432	561	**	489
Junior	(23)	404	454	366	**	375	426	498	**	426	370	389	372	509	412	**	438	435	**	**	**	**	361
Trainee	(24)	**	354	**	**	302	**	352	**	331	308	356	403	**	347	403	435	**	**	**	**	**	303
Applications Programming																							
Manager/Supervisor	**(25)**	**	**618**	**564**	**	**558**	**645**	**617**	**	**524**	**616**	**674**	**	**625**	**647**	**	**710**	**595**	**656**	**	**670**	**	**
Lead	**(26)**	**537**	**558**	**521**	**520**	**483**	**597**	**508**	**	**	**579**	**529**	**522**	**444**	**536**	**511**	**553**	**572**	**478**	**	**582**	**462**	**
Senior	**(27)**	**474**	**480**	**423**	**474**	**449**	**451**	**429**	**422**	**422**	**486**	**436**	**477**	**433**	**436**	**480**	**468**	**440**	**467**	**455**	**464**	**433**	**460**
Junior	**(28)**	**358**	**337**	**354**	**423**	**374**	**379**	**344**	**338**	**373**	**355**	**355**	**410**	**343**	**415**	**382**	**388**	**373**	**330**	**320**	**385**	**345**	**350**
Trainee	**(29)**	**257**	**261**	**313**	**343**	**302**	**304**	**288**	**335**	**353**	**299**	**286**	**323**	**326**	**357**	**292**	**377**	**305**	**299**	**	**341**	**	**286**
Data Communications																							
Manager	(30)	**	583	528	**	572	**	628	**	**	578	**	**	**	**	634	**	627	**	**	**	**	**
Operator	(31)	**	293	329	**	371	**	404	**	**	305	**	**	364	**	**	**	462	**	**	307	**	307
Computer Operations																							
Manager/Supervisor	**(32)**	**506**	**460**	**474**	**419**	**496**	**478**	**521**	**613**	**494**	**567**	**450**	**517**	**454**	**531**	**486**	**485**	**497**	**501**	**459**	**542**	**446**	**394**
Lead Operator	**(33)**	**334**	**375**	**339**	**332**	**433**	**326**	**346**	**479**	**302**	**391**	**340**	**392**	**312**	**399**	**345**	**362**	**335**	**327**	**344**	**363**	**322**	**320**
Senior Operator	**(34)**	**328**	**309**	**292**	**314**	**390**	**313**	**308**	**387**	**294**	**322**	**302**	**363**	**302**	**334**	**312**	**335**	**314**	**324**	**301**	**309**	**300**	**295**
Junior Operator	**(35)**	**283**	**267**	**283**	**225**	**308**	**252**	**274**	**313**	**242**	**272**	**233**	**262**	**250**	**273**	**253**	**262**	**277**	**250**	**280**	**269**	**301**	**247**
I/O Control Manager	**(36)**	**346**	**328**	**314**	**248**	**326**	**280**	**364**	**451**	**293**	**402**	**315**	**352**	**359**	**359**	**396**	**285**	**348**	**297**	**261**	**413**	**377**	**
Tape Librarian	**(40)**	**287**	**230**	**304**	**	**326**	**287**	**262**	**270**	**236**	**249**	**	**284**	**270**	**223**	**274**	**260**	**229**	**	**239**	**324**	**	**
Key Entry																							
Supervisor	(41)	340	304	330	314	346	329	333	**	308	383	261	347	329	334	319	381	317	300	304	351	329	310
Lead Operator	(42)	268	238	284	254	275	279	268	302	276	295	257	316	271	292	275	297	281	273	256	287	255	256
Senior Operator	(43)	242	230	238	251	256	259	245	280	226	282	237	256	256	258	236	260	263	234	227	258	254	233
Junior Operator	(44)	204	197	213	226	252	222	232	212	210	250	178	205	236	229	198	241	219	181	183	232	244	216

** Indicates insufficient information available

Average Reported Weekly Salaries for All Infosystems Jobs by Geographic Area

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY GEOGRAPHIC AREA

Region and Metropolitan Area

Job Description	Job Code	New England ME, VT, NH, MA, CT, RI	Boston	Hartford	Mid Atlantic NY, PA, NJ	Albany	Buffalo/Syracuse/ Niagara	Jersey City/Newark	New York	Philadelphia	Pittsburgh	Rochester	So. Atlantic WV, MD, DC, VA, NC, SC, GA, FL, DC	Atlanta	Baltimore	Charleston/ Richmond/Roanoke	Charlotte/Raleigh	Jacksonville/ Orlando/Tallahassee	Miami	Washington, DC	East North Central WI, MI, IL, IN, OH	Chicago	Cincinnati	Cleveland	Columbus	Dayton	Detroit	Grand Rapids	Indianapolis	Milwaukee
MANAGEMENT		(45)	(24)	(13)	(151)	(7)	(24)	(25)	(41)	(36)	(14)	(4)	(132)	(24)	(22)	(23)	(15)	(17)	(18)	(13)	(332)	(113)	(23)	(40)	(16)	(17)	(20)	(16)	(16)	(40)	← (No. Firms)
Top MIS Official	(01)	929	971	896	977	**	823	1,093	1,026	931	957	916	918	947	764	**	960	**	996	874	923	998	871	863	**	974	950	869	861	777	
Data Base Systems	(02)	680	**	**	632	**	538	**	668	**	**	597	645	**	**	**	**	**	**	**	587	622	730	573	**	**	**	**	**	**	
Data Processing	(03)	676	686	710	687	727	600	791	715	674	601	681	646	588	666	693	665	550	656	692	653	668	690	643	699	633	603	614	574	646	
Ass't D P	(04)	**	**	**	663	692	**	661	560	**	**	**	555	**	**	**	**	**	**	**	576	579	576	557	**	**	**	**	392	**	
Project/Team Leader																															
Leader	**(05)**	**514**	**570**	**626**	**734**	**660**	**576**	**684**	**694**	**823**	**773**	**573**	**549**	**556**	**553**	**540**	**	**	**	**	**672**	**704**	**724**	**806**	**	**559**	**620**	**	**	**422**	
Systems Analysis and Programming																															
Manager/Supervisor	(06)	675	659	**	750	641	**	884	756	755	**	621	614	**	643	592	595	**	**	656	690	707	821	678	596	**	644	599	628	618	
Lead	(07)	562	561	**	615	556	**	600	602	634	**	545	472	**	496	471	**	**	556	**	576	573	651	572	562	526	532	572	543	516	
Senior	(08)	510	516	530	526	444	428	548	536	533	**	509	461	525	436	446	504	531	545	**	518	523	630	537	453	482	389	443	443	494	
Junior	(09)	409	426	422	437	**	333	437	475	459	471	394	359	**	344	373	384	**	374	351	410	437	305	467	397	376	282	408	351	387	
Systems Analysis																															
Manager/Supervisor	**(10)**	**	**	**	**630**	**	**	**	**671**	**680**	**	**608**	**668**	**573**	**	**	**	**	**	**	**703**	**775**	**	**796**	**572**	**	**	**	**	**	
Lead	**(11)**	**574**	**	**587**	**585**	**	**	**545**	**621**	**582**	**620**	**538**	**574**	**500**	**	**	**	**	**	**	**662**	**606**	**	**732**	**	**	**	**	**	**	
Senior	**(12)**	**562**	**528**	**569**	**568**	**	**576**	**	**567**	**527**	**530**	**	**522**	**479**	**	**507**	**514**	**540**	**588**	**	**555**	**589**	**	**553**	**534**	**565**	**599**	**	**	**562**	
Junior	**(13)**	**456**	**475**	**450**	**421**	**	**	**469**	**493**	**397**	**	**	**424**	**415**	**	**391**	**	**	**	**	**503**	**520**	**	**	**403**	**442**	**	**	**	**	
Systems Programming																															
Manager/Supervisor	(20)	**	**	**	693	**	**	765	763	682	635	653	636	584	575	596	634	**	**	**	658	769	606	**	677	639	**	**	**	546	
Lead	(21)	**	**	**	612	**	**	663	671	620	**	538	530	533	486	**	572	**	**	**	587	672	**	520	**	566	**	**	**	528	
Senior	(22)	465	420	492	516	**	423	593	576	523	483	517	472	515	482	467	485	**	**	**	505	522	380	**	**	547	531	505	419	491	
Junior	(23)	360	326	394	408	**	308	460	488	394	467	**	395	322	447	342	**	**	**	431	401	388	315	502	**	475	**	**	**	326	
Trainee	(24)	**	**	**	377	**	**	**	378	353	337	**	316	**	321	**	307	**	**	**	322	348	**	**	**	**	**	**	**	300	
Applications Programming																															
Manager/Supervisor	**(25)**	**698**	**701**	**	**626**	**	**	**641**	**640**	**615**	**	**615**	**522**	**	**	**555**	**	**593**	**	**	**595**	**633**	**	**644**	**582**	**646**	**609**	**	**	**552**	
Lead	**(26)**	**576**	**576**	**	**498**	**	**	**590**	**560**	**561**	**476**	**467**	**484**	**	**	**505**	**	**500**	**	**	**504**	**483**	**	**496**	**565**	**509**	**545**	**	**	**500**	
Senior	**(27)**	**462**	**459**	**489**	**476**	**	**423**	**468**	**524**	**515**	**452**	**456**	**392**	**405**	**467**	**423**	**417**	**381**	**346**	**463**	**445**	**470**	**418**	**459**	**395**	**449**	**439**	**	**460**	**421**	
Junior	**(28)**	**355**	**355**	**362**	**356**	**	**328**	**384**	**383**	**363**	**359**	**396**	**338**	**343**	**343**	**330**	**315**	**274**	**315**	**325**	**351**	**368**	**278**	**353**	**340**	**362**	**364**	**365**	**324**	**379**	
Trainee	**(29)**	**308**	**303**	**	**342**	**	**	**	**359**	**331**	**330**	**	**289**	**265**	**280**	**281**	**288**	**	**	**	**298**	**342**	**230**	**321**	**288**	**240**	**	**299**	**	**262**	
Data Communications																															
Manager	(30)	**	**	**	572	**	**	**	691	655	**	**	477	428	**	**	**	**	**	**	650	705	**	647	591	**	**	**	**	**	
Operator	(31)	281	**	292	336	**	**	324	358	352	280	**	276	228	**	**	**	**	**	**	398	415	543	264	374	**	**	**	**	**	
Computer Operations																															
Manager/Supervisor	**(32)**	**482**	**467**	**530**	**501**	**	**387**	**522**	**515**	**516**	**510**	**567**	**442**	**388**	**472**	**512**	**459**	**426**	**415**	**392**	**482**	**539**	**497**	**444**	**487**	**426**	**433**	**483**	**523**	**511**	
Lead Operator	**(33)**	**355**	**328**	**406**	**398**	**409**	**	**373**	**442**	**446**	**399**	**387**	**308**	**312**	**308**	**306**	**324**	**301**	**285**	**368**	**333**	**326**	**291**	**334**	**368**	**320**	**376**	**346**	**418**	**462**	
Senior Operator	**(34)**	**300**	**291**	**332**	**370**	**306**	**281**	**319**	**337**	**335**	**332**	**312**	**289**	**273**	**296**	**294**	**287**	**257**	**277**	**345**	**312**	**321**	**276**	**295**	**348**	**311**	**343**	**281**	**288**	**361**	
Junior Operator	**(35)**	**266**	**258**	**290**	**267**	**264**	**208**	**285**	**253**	**315**	**274**	**311**	**253**	**231**	**260**	**254**	**238**	**212**	**227**	**277**	**267**	**270**	**217**	**286**	**278**	**246**	**255**	**253**	**219**	**330**	
I/O Control Manager	**(36)**	**281**	**266**	**286**	**368**	**	**328**	**397**	**320**	**347**	**294**	**	**260**	**292**	**255**	**253**	**264**	**241**	**	**252**	**340**	**353**	**336**	**407**	**	**	**	**291**	**	**321**	
Tape Librarian	**(40)**	**241**	**239**	**243**	**315**	**288**	**	**217**	**250**	**299**	**262**	**	**291**	**223**	**219**	**280**	**231**	**	**254**	**	**280**	**292**	**241**	**320**	**	**256**	**	**	**264**	**293**	
Key Entry																															
Supervisor	(41)	325	340	314	324	313	273	378	321	325	327	342	300	361	298	306	335	290	302	311	330	359	266	337	338	292	373	315	355	347	
Lead Operator	(42)	263	266	261	273	269	252	301	277	261	273	286	246	262	247	238	238	231	256	281	277	267	250	263	329	245	308	271	288	303	
Senior Operator	(43)	244	253	237	245	237	220	254	243	246	237	248	216	236	214	222	222	215	225	250	252	257	207	258	272	207	265	245	219	256	
Junior Operator	(44)	207	192	230	195	207	181	197	207	201	224	220	203	210	188	217	188	194	197	212	222	224	166	254	228	200	212	206	200	242	

** Indicates insufficient information available

AVERAGE REPORTED WEEKLY SALARIES FOR ALL INFOSYSTEMS JOBS BY GEOGRAPHIC AREA

Region and Metropolitan Area

Job Description	Job Code	Springfield	East North Central (KY, TN, MS, AL	Louisville	Nashville	West North Central (ID, MN, SD, MO, LA, KS, MT)	Des Moines	Kansas City, KS, MO	Lincoln/Omaha	Minn./St. Paul	St. Louis/E. St. Lou's	West South Central (TX, OK, AR, LA)	Austin/San Antonio	Dallas/Ft. Worth	Houston	New Orleans	Oklahoma City	Mountain (ID, MT, ID, WY, NV, CO, AZ, NM)	Denver	Phoenix	Pacific: WA, OR, CA	Los Angeles	Portland	San Diego	San Francisco/Oakland	Seattle/Tacoma	National Average Comparison 1982	1983	% Increase/ Decrease
MANAGEMENT		(12)	(27)	(10)	(13)	(115)	(13)	(23)	(17)	(39)	(23)	(91)	(24)	(34)	(16)	(4)	(13)	(61)	(24)	(22)	(220)	(111)	(18)	(17)	(40)	(34)	1,106	1,176	
Top MIS Official	(01)	**	784	763	**	1,008	1,088	951	895	1,041	991	1,057	775	1,188	1,094	**	1,006	936	**	1,052	965	971	1,103	**	946	915	913	959	5.0
Data Base Systems	(02)	**	**	**	**	702	**	**	506	**	**	646	**	621	**	**	665	731	**	**	732	**	**	**	**	**	655	648	−1.1
Data Processing	(03)	596	597	617	583	672	705	659	666	678	653	696	612	743	849	710	605	724	725	717	676	704	588	653	667	650	660	670	1.5
Ass t D P	(04)	**	528	**	**	591	**	603	585	664	**	632	**	**	581	**	**	668	636	**	576	542	436	596	**	592	624	627	0.5
Project/Team Leader																													
Leader	(05)	580	600	565	**	629	674	517	518	571	776	619	645	627	**	540	684	650	**	591	693	742	800	725	592	586	613	656	7.0
Systems Analysis and Programming																													
Manager/Supervisor	(06)	**	581	634	570	688	677	634	717	668	**	647	589	672	738	711	734	727	725	728	730	720	**	623	788	684	652	691	6.0
Lead	(07)	529	489	**	**	517	517	526	545	535	**	591	550	576	642	**	590	537	564	559	575	583	509	537	586	590	591	567	−4.1
Senior	(08)	488	447	459	526	491	472	493	489	494	496	509	473	513	551	**	484	527	549	545	538	565	449	454	541	514	505	515	2.0
Junior	(09)	399	413	**	425	401	364	415	387	419	453	389	451	409	413	**	320	446	447	411	411	479	391	418	438	382	387	408	5.4
Systems Analysis																													
Manager/Supervisor	(10)	**	543	**	**	746	**	**	**	**	611	719	**	719	**	**	**	825	807	**	671	673	653	**	**	**	650	688	5.8
Lead	(11)	545	**	**	**	598	**	565	497	**	**	596	**	603	**	**	**	629	**	629	649	649	**	**	**	**	604	609	0.8
Senior	(12)	501	**	**	**	560	457	485	485	566	**	564	**	596	**	592	452	588	**	**	593	555	545	528	**	**	536	570	6.3
Junior	(13)	364	388	**	**	552	**	510	**	525	527	498	**	498	**	**	**	469	**	**	585	421	**	476	427	**	378	513	35.7
Systems Programming																													
Manager/Supervisor	(20)	**	580	**	**	673	**	655	692	682	737	749	**	752	788	650	**	710	793	**	603	727	654	558	**	**	662	669	1.1
Lead	(21)	**	**	**	**	554	**	587	615	557	673	678	681	663	**	624	**	578	**	549	555	624	**	539	586	588	575	579	0.7
Senior	(22)	406	525	**	**	529	512	510	508	506	507	586	549	596	635	**	624	547	663	524	547	534	553	530	515	546	507	526	3.7
Junior	(23)	319	489	**	**	468	**	451	461	448	**	520	528	521	575	454	**	429	**	428	454	452	468	**	459	416	380	430	13.2
Trainee	(24)	**	322	**	**	367	**	420	403	361	**	403	**	**	**	**	**	323	**	323	324	347	**	284	377	323	279	345	23.7
Applications Programming																													
Manager/Supervisor	(25)	**	**	**	**	598	610	452	**	**	745	**	**	**	**	**	**	694	626	**	675	681	**	682	669	**	625	618	−1.1
Lead	(26)	**	**	**	**	530	499	423	460	625	537	474	464	466	**	**	**	531	589	543	557	587	499	492	546	528	534	524	−1.9
Senior	(27)	368	435	**	441	429	411	401	428	441	469	471	439	450	518	528	429	520	567	521	481	503	420	457	521	442	455	452	−0.7
Junior	(28)	317	344	307	362	367	362	355	330	373	378	372	346	355	391	458	344	413	400	478	397	433	350	423	416	364	365	364	−0.3
Trainee	(29)	**	250	259	236	309	301	296	298	327	**	314	324	317	**	328	245	291	288	296	341	350	**	275	339	345	300	308	2.7
Data Communications																													
Manager	(30)	**	**	**	**	655	**	**	566	**	**	**	**	**	**	**	**	537	524	550	674	646	**	**	586	**	526	619	17.7
Operator	(31)	**	**	**	**	**	**	**	**	**	**	348	307	**	**	**	**	329	300	358	416	364	**	**	344	353	334	367	9.9
Computer Operations																													
Manager/Supervisor	(32)	420	465	482	447	466	498	458	440	491	439	519	585	467	543	596	576	549	547	601	516	506	546	581	528	500	465	488	4.9
Lead Operator	(33)	341	333	343	341	328	344	321	318	330	324	351	363	335	404	407	326	411	380	474	405	418	414	364	403	390	335	358	6.9
Senior Operator	(34)	298	290	297	277	297	308	293	295	307	290	316	319	312	347	364	278	344	350	331	353	347	355	358	354	367	302	325	7.6
Junior Operator	(35)	251	240	250	260	262	272	275	243	270	232	279	272	269	319	225	275	301	266	317	290	298	302	245	314	274	252	271	7.5
I/O Control Manager	(36)	*	279	324	234	366	241	280	**	436	**	327	330	280	316	412	339	388	321	399	365	359	421	441	327	333	309	333	7.8
Tape Librarian	(40)	**	245	260	230	256	239	**	**	270	263	247	278	218	**	259	**	288	252	278	290	279	310	275	312	294	266	282	6.0
Key Entry																													
Supervisor	(41)	384	291	336	279	284	312	316	308	320	250	355	352	357	366	338	307	387	411	351	379	358	333	311	360	359	289	330	14.2
Lead Operator	(42)	291	217	242	235	255	263	289	262	274	240	264	317	238	324	235	244	294	295	288	314	310	319	273	308	326	257	274	6.6
Senior Operator	(43)	226	214	210	211	247	241	250	238	257	220	238	248	225	299	213	234	268	279	254	291	287	294	241	299	280	236	253	7.2
Junior Operator	(44)	201	180	174	182	210	208	235	200	231	181	204	227	194	239	186	193	262	217	203	260	276	241	228	258	230	209	222	6.2

(No. Firms)

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such as Datapoint and Wang. Perhaps most threatening to the entire field are emerging LAN products from IBM and American Bell.

A number of the new products offer features similar to those of Ethernet, a network scheme which has become something of a standard in the industry. Ethernet, a baseband-type LAN, offers transmission rates of 10 million bits per second and connect costs of as much as $1,000 per connection.

The Harris and NBI products and one introduced jointly by NCR and Intel are baseband products. NBI's is compatible with Ethernet, while the NCR/Intel "Mirlan" network offers about one-tenth the performance of Ethernet at about one-fifth the connect cost, reportedly. The 3M and CAI LANs, broadband products, allow transmission of non-digital information such as voice and video data.

Vendors of established LANs are not sitting still in the face of growing competition. Xerox has added a number of products to its Ethernet-compatible line, and undertaken a joint effort with VisiCorp and 3Com to allow the IBM PC to access the LAN. Datapoint, meanwhile, has taken steps to make its ARCnet compatible with LANs from other companies.

How is the MIS manager to choose a network in the face of a mushrooming set of contenders and conflicting claims? NBI's John Melanson asserts that compatibility with emerging industry standards is a key consideration, although the form these standards will take is not yet clear. "Because the direction (of LAN standards) is awfully hazy," he says, "the most important thing is picking a LAN that has the flexibility to conform to standards as they come out. Long-term customers won't accept one company's solutions."

—DHF

Local area network capabilities vary widely

Local area network (LAN) capabilities vary widely in terms of the different equipment makes they can support as well as the type and speed of the information they can transmit. For example, one LAN technology accommodates date, voice and full-motion video. Another permits only data communications.

nearly 50 products, present and future industry participants and their competition.

Ethernet still does not have a lock on the market, however. A great deal of research and development goes on in token-passing rings, the LAN technology advocated by IBM. BCC expects an IBM announcement soon.

LOCAL AREA NETWORK REPORT SUMMARY
($ millions)

Forecast	1982	1986	1990	Average Annual Growth Rate %/Yr.
Worldwide LAN Sales	127	517	743	25
Broadband LAN Sales	55	215	424	29
Worldwide LAN Installations	6625	16000	17670	12
Broadband LAN Installations	420	2240	3534	30
LAN Penetration in the U.S. among Companies having more than 20 employees	1%	9%	17%	—

Source: Business Communications Co.

Both US and European standards bodies have settled on Ethernet-compatible specifications, providing a considerable boost to the Xerox, DEC and Intel system. What's more, the most rapid advances in terms of the application of fiber optics and VLSI (Very Large Scale Integration) technology to local networking have come from Ethernet-compatible manufacturers.

These assessments emanate from a new report from Business Communications Co. (BCC) of Stamford, CT. The report, "Emerging Local Area Network Business," analyzes

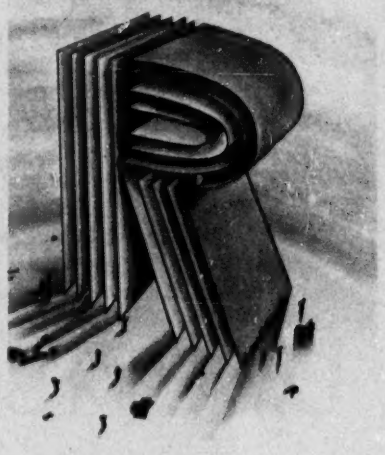
Product and market strategies range widely. At one end of the spectrum are computer disk storage-based microcomputer networks targeted for small businesses. At the other end are local networks designed to connect mainframes at industry, government and university computer centers. In between, the market encompasses a variety of office and factory local networks.

For more information on this report **Enter No. 4** on the Reader Information Card at the back of the magazine.

—WLR

. . . continued on page 28

A seminar on R.



Seminars on Cullinet's relational database management system, IDMS/R, will be held in the following cities during the next few weeks.

Atlanta, GA	Sep. 14	Montreal, QUE. (Fr.)	Sep. 15
Augusta, GA	Sep. 1	Nashville, TN	Sep. 13
Austin, TX	Sep. 15	New Orleans, LA	Sep. 29
Boston, MA	Sep. 20	New York, NY	Sep. 21
Calgary, ALTA	Sep. 15	New York/ Long Island, NY	Sep. 13
Charlotte, NC	Sep. 22	New York/ Rye, NY	Sep. 7
Chicago, IL	Sep. 7	Norfolk, VA	Sep. 28
Cincinnati, OH	Sep. 7	Omaha, NE	Sep. 29
Cleveland, OH	Sep 22	Ottawa, ONT	Sep. 13
Columbus, OH	Sep. 9	Parsippany, NJ	Sep. 23
Dallas, TX	Sep. 7	Philadelphia, PA	Sep. 28
Des Moines, IA	Sep. 28	Sacramento, CA	Sep. 27
Eau Claire, WI	Sep 21	St. Louis, MO	Sep. 6
Evansville, IN	Sep. 27	Salt Lake City, UT	Sep. 27
Grand Rapids, MI	Sep. 15	San Diego, CA	Sep. 13
Hartford, CT	Sep. 14	San Francisco, CA	Sep. 15
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Indianapolis, IN	Sep. 20	Seattle, WA	Sep. 29
Jacksonville, FL	Sep. 29	Southfield, MI	Sep. 15
Kansas City, MO	Sep. 22	Toledo, OH	Sep. 27
Lexington, MA	Sep. 7	Toronto, ONT	Sep. 20
Los Angeles, CA	Sep. 21	Tucson, AZ	Sep. 28
Louisville, KY	Sep. 7	Washington, DC	Sep. 7
Memphis, TN	Sep. 20	Wichita, KS	Sep. 20
Miami, FL	Sep. 29	Winnipeg, MB	Sep. 28
Milwaukee, WI	Sep. 13	Worcester, MA	Sep. 22
Minneapolis, MN	Sep. 8		
Montreal, QUE. (Eng.)	Sep. 14		

I'm interested in reserving a place at the IDMS/R seminar

in (city) _____ on (date) _____

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Title _____

Company _____

Address _____

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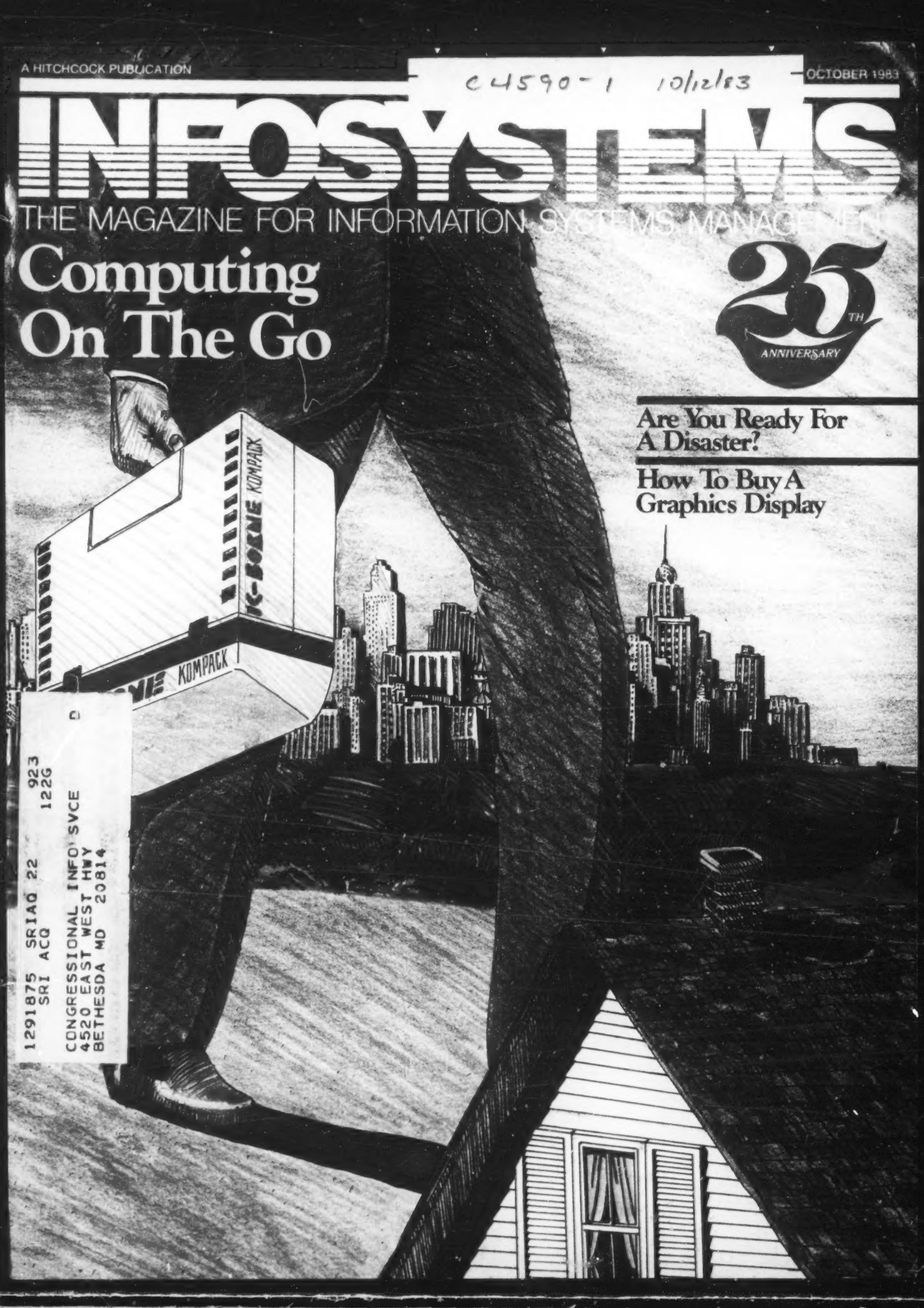

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The Metamorphosis of the Job Market

The astute MIS manager can benefit from the turmoil automation is bringing to the workplace by changing some jobs, eliminating others and causing still others to spring into existence.

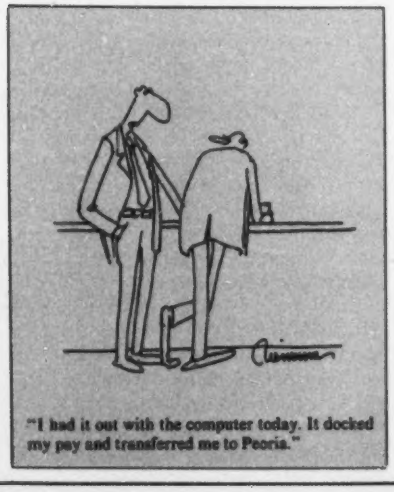
By Wendy Lea McKibbin, Senior Editor

Computers and robots may eliminate the manual and the menial but they are not universally hailed as the worker's best friend. Not yet, anyway.

The London Daily Telegraph recently reported that a group of Soviet factory workers were found bashing in robots on the production line. The situation in one factory was so volatile that management erected a fence to protect the robots. Even so, a heavy slab "mysteriously" fell on one of the machines, making it necessary to extend the fence to the ceiling.

While hostilities might not be so inflamed in the US, the issue of automation and its impact on the workplace is the subject of intense scrutiny by the government and certain sectors of private enterprise. Almost no one contests that in the long run, automation will increase productivity, create new jobs, spawn new industries and improve the standard of living. But it will also displace (so change the nature of one's job as to require retraining) and replace thousands of workers in the basic industries: in steel, railroads, automobile manufacturing, rubber and textiles.

At least one study shows evidence that white-collar executives will probably be replaced if they resist computerization. Automation, however, is less likely to cause replacement than stress for the white-collar worker who must master unfamiliar technologies.



"I had it out with the computer today. It docked my pay and transferred me to Peoria."

At present, we seem to view automation as a mixed blessing. A current study by the Opinion Research Corp. reveals that while the majority of Americans expect to benefit from automated work procedures, nine out of ten anticipate that automation will create anxiety over employment. And more than half of the respondents believed that job opportunities would be reduced by computer technology.

Problem or panacea?

In general, experts are polarized on the great questions as to the size, scope and potential disruption of robots and computers in the work world. Some regard automation as a problem in view of the current 9.5 percent unemployment. Others welcome it as a panacea, a positive elevating force that will consign boring and dangerous jobs to machines, while inviting humans to be more creative and productive.

One is reminded of the blind men describing the elephant. No one seems able to put all of the pieces together or say with certainty how fast automation is creeping into factories and offices or exactly how many people might actually be replaced or displaced due to technological advances. "It's an impossible figure to get at," admits Mike Pilot, manager of occupational outlook studies for the Bureau of Labor Statistics.

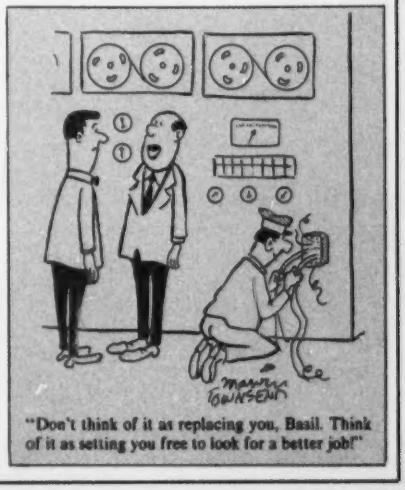
The only conclusive statement that can be made on the matter is that the high technology revolution is irreversible and will continue to transform the workplace, says Peter Maritz, legislative assistant to Congressman Richard Gephardt of the House Budget Committee. Earlier this year, Congressman Gephardt and Doug Walgren of the House Committee on Science & Technology held seven days of joint hearings on technology and employment. Eight panels of experts came in to discuss trends, employment projections, demographics, automation in the factory and office and training needs.

"These experts emphasized that adequate statistics on what is likely to happen simply do not exist," says Maritz. "Nor do we know where to find such information. How much do we know about our present economy, much less the way our economy will be 10 years from now?"

But if statistics are scanty, opinions abound. At one end of the spectrum are legislators like Congressman Bob Edgar (D-PA) who warn that automation is bringing "catastrophic" changes not being addressed by the current administration; catastrophic, that is, in view of the 20 million people whom Edgar says are either out of work or underemployed. (Edgar arrives at the figure of 20 million by counting not only the 11 to 12 million represented by 9.5 percent unemployment, but the additional eight to nine million who he says are working at substandard or part-time jobs.)

Opposite stance

The opposite stance is taken by former White House advisor and sociologist Amitai Etzioni who claims we are hearing much ado about nothing. "The significance of the automation issue has been vastly exaggerated," he scoffs. "We are talking about three-quarters of one



"Don't think of it as replacing you, Basil. Think of it as setting you free to look for a better job!"

"I was replaced by a computer, but they kept me on for historical perspective."

"No one will be in demand in the next 20 years like computer programmers."

percent of the labor force that will have to be shifted due to high technology."

Etzioni, author of the book, *An Immodest Agenda: Rebuilding America Before the 21st Century*, maintains that the elimination of jobs stemming from automation will be gradual, stretching out over a 10- to 20-year period. He anticipates plenty of time for people to retrain and stay ahead of the changing job market. A secretary can become computer literate in two weeks, he says. How serious is a crisis that can be solved in two weeks?

"My advice is to take negative statements about automation with the biggest grain of salt to be found," concludes Etzioni.

Most auto workers, metal workers and machinists will probably not take Etzioni's advice. Of the 32 million US blue-collar workers, about eight million have jobs that robots could do. The auto industry will be one of the heaviest users of these new "steel-collared workers," a term coined by Dr. Marvin Cetron, president of Forecasting International Ltd. In fact, General Motors is already planning to install at least 14,000 robots in its manufacturing facilities before 1990.

Perfect employee

A perfect employee that never goes on strike and never gets sick, today's variety of robot can replace 1.7 workers. That adds up to six people if it works all three shifts. "Smart robots" that can see, touch, or hear and that incorporate artificial intelligence technologies can replace five people on a single shift. By one estimate a robot with binocular vision will cost less than $5,000 by 1990, which means that for less than the cost of an automobile worker's medical package, a manufacturer can replace six laborers.

Dr. Cetron foresees a veritable army of robots in place by the turn of the century, replacing 4.4 million workers. Robots are of particular interest to manufacturers hard pressed to stay competitive with the Japanese. They may also be used to take over hazardous jobs in nuclear plants, mines, genetic laboratories and exploration stations under the ocean and in outer space.

Even though many new industries will be opening up in the next 20 years, notably robotics, genetic engineering and telecommunications, Dr. Cetron predicts that robots will cause a massive and painful dislocation of workers in the Great Lakes states, California and New York. These are the states where many auto plants are located.

To date, not much has been done to help the workers whose jobs are disappearing. Only a smattering of corporations have set up retraining programs and the current administration prefers the "natural market forces" method of adjustment. Still, Digital Equipment is presently tutoring 450 displaced repair and installation technicians for sales positions and General Motors has a worker re-education program at two of its closed auto plants.

There is also the Job Training Partnership Act (JTPA) which will go into effect this month to replace the Comprehensive Training Act (CETA). This marks the first legal provision in history for retraining those displaced by automation. The question remains, can these workers adjust to the changing times, learn new professions, and re-integrate into the job market?

Where will the jobs be?

There will be major shifts in employment patterns by 1990, and according to official projections, a lower unemployment rate of 6.5 percent. Automation will continue to transform the texture and fabric of the US marketplace, erasing some professions, profoundly altering others. More important, it will call into existence some fascinating new careers.

In his book co-authored with Thomas O'Toole, *Encounters with the Future: A Forecast of Life into the 20th Century*, Dr. Cetron suggests some possibilities. Technicians who service and repair robots, for example, may account for two million jobs by the year 2000. Laser technicians who replace tool- and die-makers may account for 2.5 million jobs by 1990. We may well need geriatric social technicians to care for the growing numbers of the elderly, bionic technicians to make bionic limbs, and battery technicians who will service the fuel cells and batteries used to power cars in the future.

United States
Projected Job Growth 1983-1987

	Projected New Jobs	Projected Increase
Technical Professional Categories		
Electronic/Electrical Engineers	32,172	66%
Software Engineers	23,379	115%
Mechanical Engineers	6,890	59%
Industrial/Mfg. Engineers	6,944	68%
Other Engineers	11,540	40%
Computer Analysts/Programmers	10,068	103%
Electronic Engineering Technologists	7,454	107%
Other Technical Professionals	8,653	58%
Total Technical Professionals	109,449	89%
Technical Paraprofessional Categories		
Electronic Technicians	25,981	63%
Assembly Personnel	65,242	64%
Drafting Personnel	5,975	73%
Other Technical Paraprofessionals	16,526	47%
Total Technical Paraprofessionals	115,154	66%
Total All Categories		
Total All Technical Employees	224,603	64%
Total All Technical and Non-Technical Employees	336,058	48%

"I need a few dozen employees to work until we can afford to replace them with a computer."

At present, Americans seem to view automation as a mixed blessing.

Many traditional sectors of enterprise will also flourish. According to the Bureau of Labor Statistics, there will be 700,000 new jobs for secretaries by the end of the decade. Job opportunities are expected to be promising for paramedics, restaurant operators, waiters and waitresses. With shorter work weeks in the future, there should be a boon in the leisure-related professions.

Automation is also likely to have a positive effect on employment in commercial services, financial institutions, and the government. Some experts foresee increasing numbers of the self-employed and the work-at-home employee during the next 10 years.

On the negative side, jobs are expected to dwindle in agriculture, forestry and physical therapy. Ditto farming, mining, durable goods—such as stone, clay, glass, primary metals—paper, textile, and tobacco. Even printing and publishing are likely to experience a negative impact in employment due to automation.

High-tech outlook

The future couldn't be brighter, of course, for high tech engineers and computer scientists, particularly programmers. "No one will be in demand in the next 20 years like computer programmers," says Dr. Cetron.

The American Electronics Assn. (AEA) estimates that between 1983 and 1987 there will be 197,662 new jobs for electronic and electrical engineers and computer science engineers—but only 84,256 graduates. That leaves a projected shortfall of 113,406 professionals (or 81,780 if defense contract projections are eliminated).

The Dept. of Labor estimates that jobs for computer programmers will grow from the 228,000 on record in 1980 to as many as 366,000 by 1990. By the end of the decade, there will be between 343,000 to 368,000 new jobs for systems analysts, as many as 338,000 new jobs for computer operators, approximately 70,000 new positions for peripheral and DP engineers and at least 170,000 new openings for other data processing professionals.

Management consultant Michael Rottblatt of Korn/ferry International is sanguine about the opportunities that automation will create for Management Information Systems (MIS) managers. He foresees a fundamental shift in the power structure of the corporation, an alteration that will put decision support professionals in line for the chief executive officer's slot. But it is an opportunity, he notes, rather than a cinch. The price of appropriation will include gaining business and management expertise.

"The astute MIS manager can aspire to be president of the company in the future, if he takes advantage of his position," asserts Rottblatt. "Information is power in business today. He who controls the flow of information should be regarded as the most important person in the corporation."

Threefold procedure

The procedure for taking advantage of one's position is threefold. First of all, as a decision support professional, the MIS manager should become the resident expert on the company's business. He should get closer to the user function, be included in meetings of the planners and forecasters, and understand every need of the business, both present and future.

Second, Rottblatt recommends an aggressive strategy. The MIS professional should answer before he is called. He should push hard for a higher reporting relationship and settle for nothing less than reporting to the president. He should be a step ahead of the game, be

Are Computers Hazardous to Our Health?

The malady is called "cyberphobia" and it refers to the stress and anxiety that many feel working with a computer. According to Dr. Bee Epstein, a California-based consultant, it affects about 30 percent of the population—and not only on the initial encounter. Some people never warm up to the machine.

Tim Wei, director of information systems for the City of San Jose, once observed this phenomenon in his organization. A secretary to one of the department heads was asked to part with her familiar and trusted typewriter of many years in favor of a new word processor. She was sent to class again and again but to no avail. Finally, the company had to give up.

"Her fingers literally shook when she sat down at the keyboard," recounts Wei. "It was finally obvious to everyone that she simply couldn't be trained."

Extreme though this example might be, fear of computers is no laughing matter, according to Epstein, who describes herself as a student of "tech-psych," the psychology of technology. Rapid automation is causing stress within the work environment, because the computer is an "A-type" employer. The computer puts a lot of pressure on the person at the keyboard, says Epstein, because it processes information so quickly. The worker often feels pressured to keep up with the flow of information and to meet production deadlines.

Stress, it would seem, is a costly business. A study done by the National Science Foundation in 1977 reported that stress and related problems cost $100 billion a year to US industry. This figure takes into account such factors as increased absenteeism, loss of productivity, the cost of replacing employees, and the loss of potential customers and business due to poor employee performance.

The reason why computers are stressful to so many is that the "humanware," has not been taken into account, says Epstein. A term uniquely her own, she defines humanware as the human element in the high technology environment: the way in which people and systems work together in the office.

Epstein's ideas are not only of interest to computer neophytes and personnel managers. The Data Processing Management Assn. of Alaska has contracted her to conduct stress reduction and communications workshops for its members.

"Data processing people aren't afraid of computers but they often suffer stress," she says. "They also need help developing better humanware skills."

With thorough training procedures in the office, Epstein believes that neophytes and experts alike can live more comfortably with computers.

"I am an equal opportunity employer . . . I employ three different types of computers!"

"The astute MIS manager can aspire to be president of the company..."

the first to say, "Here's how I can help." At meetings, he should be prepared to show how MIS could support the planning function by modeling, simulations and forecasts. Information is worthless unless presented to the right person in time to influence the decision-making process, Rottblatt stresses.

"The goal is to have management so appreciate the MIS function as to become dependent on it," says Rottblatt. "That automatically enhances the power of the data processing professional's position."

Finally, the MIS manager *must* be knowledgeable about the latest and the greatest in computer technology—or else be passed by. Rottblatt admits that this is a tall order in view of the exponential rate at which computer technology is advancing, but essential nonetheless for the manager with a career plan.

Perhaps no sector of industry takes better advantage of corporate MIS nor will offer them more advantages in the automated age than the financial services industries. Rottblatt observes that financial industries are information bound, and so spend more on the needs of information processing than anyone in the business. Consequently, they usually have state-of-the-art equipment.

It is also probable that the head of MIS for a financial institution will have the title of vice president and will report to the president, says Rottblatt, who recently witnessed a corporate MIS manager named to the management group of the top six people in a large bank.

Automation should ultimately elevate the value of the MIS function in other industries, too, Rottblatt predicts. Manufacturing, however, will probably take the longest to realize the impact that MIS can make on the organization.

The future is here. Rottblatt predicts that within the next five years, decision support professionals will find a broader scope to their jobs and discover that greater demands are made on them as a result of the automated office. His advice to MIS is to push the frontiers and then offer solutions before being asked.

"Luck," he is fond of saying, "is preparedness beating opportunity."

Whether automation is the *summum bonum*, the highest good, as Rottblatt might suggest, or an angel with a tarnished halo that will take its toll on the unskilled and unprepared, it seems clearly to portend tremendous opportunities ahead for the computer professional. (M)

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